AN

APPENDIX,

OR

SECOND PART,

TO THE

COMPLEAT TREATISE

ON

PERSPECTIVE.

CONTAINING

A BRIEF HISTORY OF PERSPECTIVE,

FROM THE EARLIEST AND MOST AUTHENTIC ACCOUNTS OF IT,
DOWN TO THE EIGHTEENTH CENTURY,
WHEN IT FIRST BEGAN TO FLOURISH IN ENGLAND.

IN WHICH,

THE METHODS OF PRACTICE, USED BY THE ANCIENTS, ARE EXEMPLIFIED,
AND COMPARED WITH THOSE NOW IN USE.

MILITARY PERSPECTIVE, BIRD'S-EYE VIEWS, &c.

THE APPEARANCES OF ASCENDING AND DESCENDING, ON AN UPRIGHT PICTURE;

SUCH DECEPTIONS IN VISION ACCOUNTED FOR,

AND

ILLUSTRATED BY STRIKING REPRESENTATIONS;
WITH USEFUL AND CRITICAL REMARKS ON ROUND OBJECTS, IN GENERAL.

THE APPLICATION OF PERSPECTIVE TO SCENERY,
ALSO TO A SHIP, AND IN LANDSCAPE.

PROJECTION ON CURVED SURFACES,
WITH OTHER DISTORTIONS, OR ANAMORPHOSES.

INVERSE PERSPECTIVE;

ALSO,

THE DOCTRINE OF REFLECTION, ON PLANE MIRROURS.

AND LASTLY,

IT CONTAINS A PARALLEL AND CRITICISM ON ALL THE ENGLISH AUTHORS,
WHO HAVE WROTE TREATISES ON PERSPECTIVE;
AND THE PRINCIPLES OF DR. BROOK TAYLOR'S PERSPECTIVE
COMPARED WITH GUIDUS UBALDUS,
AND, 'S GRAVESANDE.

THE WHOLE DELIVERED IN NINE SECTIONS,
AND ILLUSTRATED BY TEN, LARGE, NEAT, AND CURIOUS, FOLIO PLATES,

By THOMAS MALTON.

LONDON:

Printed for the Author; and sold by Messrs. ROBSON, in Bond-street; BECKET, Adelphi, Strand;
TAYLOR, near Great Turnstile, Holborn; DILLY, in the Poultry, and by the AUTHOR.

MDCCLXXXIII.

AN

INDEX, and TABLE of CONTENTS.

PREFACE, ſhewing the general PLAN.

SECTION I.

A Brief Hiſtory of PERSPECTIVE, *from the earlieſt Accounts of it*; *from* Vitruvius, *a Roman Architect* 4
The principal Writers on Perſpective, *from the 15th Century* — — 6
A Deſcription of Vignola's *and* Sirigatti's *Method, and Proceſs* — — 7
A Parallel *of* Sirigatti, *with the Method on the new Principles* — — 8
An Example, *illuſtrating the utility and excellence of the Method by* Vignola *and* Sirigatti, *in many Caſes* 10
The Principles of Vignola's ſecond Rule *displayed* — — — 13
In which may be diſcovered great advances towards rendering the Theory and uſe of Vaniſhing Points *general* 15
The Methods of Practice by J. Vredeman Frieze, *and* A. Boſſe — — 16
A Parallel *of their Method, with that on the new Principles* — — 17
An account of the Work uſually called the Jeſuit's Perſpective — — 18
An account of Andrea Pozzo's *Method*; *exemplified and compared* — — 21
An Example *of the Method uſed by the old Writers on Perſpective, in projecting irregular Solids*; *or Bodies obliquely ſituated* — — — — 24
The utility, deſcription, and application of an Apparatus *for taking general Views, or complicated Objects*; *without underſtanding Perſpective* — — — 25
Other Apparatus *deſcribed, for taking Views, or Sketches* — — — *to* 27

SECTION II.

Military PERSPECTIVE — — — — 27
Bird's Eye Views; *the Rationale, and Examples of* — — 29
Of Horizontal Pictures; *with an Example* — — 30

SECTION III.

Remarks on DECEPTIONS *in* VISION, *and* IMAGINATION; *reſpecting the appearance of* Deſcending, *whilſt we are moving on a level with the Horizon* — — — 31
The Deception *illuſtrated, and clearly accounted for* — — — 32
Of the Effects *which Right Lines, in any poſition to the Horizon, have on other Lines contiguous to them* ibid.
The ſame Line, *on the Picture, may be made to appear either as aſcending or deſcending*; *and the ſame* Space *on the Picture (having the ſame Vaniſhing Line) may appear either to aſcend or deſcend*; *exemplified* 33
Remarks on the Appearances *of round Objects* — — — — 35
The rationale *of the apparent curviture of Lines on their Surfaces explained*; *and the* abſurdity *of drawing ſuch Objects without conſidering it, properly, and with due attention* — — 36
Examples *illuſtrating thoſe Obſervations* — — — — 38

SECTION IV.

The application of PERSPECTIVE *to* SCENERY; *with* Remarks *on the Authors who have treated thereon* 40
How to repreſent a given Subject, on various detached Pieces; *the true places of the* Wings, *or* ſide Scenes, *being determined, abſolutely, by it*; *according to the length and declivity of the Stage* — 41
The above Proceſs *exemplified, by a complete* Set of Scenes, *for an internal View of a* Banqueting Houſe, *or other place of Entertainment* — — — — 44
Remarks on the uſual Method, by Reticulation — — — — 47

SECTION V.

The application of PERSPECTIVE *to a* SHIP, *in which is laid down, the geometrical Conſtruction, and from that, the whole Proceſs, how to give its true Figure, in perſpective, from any determined Station, or Point of View* 48

SECTION VI.

Of the utility *and* application *of* PERSPECTIVE *in* LANDSCAPE — — 54
ſhewing, by a few elementary Problems or Rules, how one Object in the Picture may be proportioned by another; *at any diſtance from each other, the parts being diſtinct.*
The Abſurdities *pointed out and exemplified, which a* great Artiſt *may be liable to, without underſtanding* ſomewhat of Perſpective; *or conſidering, properly, the invariable* Laws of Nature — 59

INDEX, AND TABLE OF CONTENTS.

SECTION VII.

The Method of delineating on CURVED SURFACES; *explained and exemplified, by a given Subject* 65
A Parallel *of other Authors, on the ſame,* Hamilton *and* Kirby — — — 67
Of diſtorted Repreſentations, *in perſpective, and* Anamorphoſes; *in which, one is ſhewn, and clearly evinced to be a ſpecies of the other* — — — 68

SECTION VIII.

To deſcribe the perſpective Contour, or Outline of a Globe, *from any Radius given, in perſpective* 70
The application of it, from a geometrical Data — — — 71
Inverſe Perſpective, *or the reduction of Objects, perſpectively drawn, to their geometrical form and proportion* 72
The Doctrine of Reflection, *on plane Mirrours* — — — 75

SECTION IX.

A PARALLEL *and* CRITICISM *of the Engliſh Authors, on* PERSPECTIVE; *and the new* Principles *compared with* GUIDUS UBALDUS, *a Work publiſhed in* 1600 — — — 80
Remarks on Bernard Lamy; *who publiſhed in* 1701 — — — 84
Remarks on 'sGraveſande's *Perſpective; ſhewing what advances were made by him, towards rendering the knowledge of Vaniſhing Lines and Points univerſal* — — — 85
Remarks on H. Ditton's *Perſpective* — — — 89
——— *on Dr.* Brook Taylor's *Perſpective* — — — 93
——— *on* Hamilton's *Perſpective* — — — 98
——— *on* Kirby's *Brook Taylor made eaſy* — — — 100
——— *on* Ware's *Tranſlation of* Sirigatti — — — 106
——— *on* Kirby's *Parallel of* Sirigatti — — — 107
——— *on* Kirby's *Perſpective of Architecture* — — — 109
——— *on* Highmore's *Perſpective* — — — 122
——— *on* Daniel Fournier's — — — 126
——— *on Profeſſor* Cowley's — — — 131
——— *on Dr.* Prieſtley's *Perſpective* — — — 135
——— *on* Noble's *Perſpective* — — — 138
——— *on* Ferguſon's *Perſpective* — — — 145
——— *on* Clarke's *Perſpective* — — — 150
Remarks on the Reviewers *of the* Author's Treatiſe — — — 155
——— *on various mathematical Authors, and Painters* — — — 159

ERRATA.

In order to find the Error more readily, the ſecond Column particularizes which Paragraph it is in, in each Page.

Note. When two or three ſhort Paragraphs come together (between Spaces) they are accounted as one.

Page.	Par.	Line.	
7.		laſt.	*for* OP, *read* EF.
8.	4.	3.	for *b e f e*, read *b e f c*.
9.	3.	1.	*for* QR, *read* PQ.
18.	2.	9.	Bottom, *for* OM, *read* oM.
19.	5.	1.	*for* Fa, *read* F*a*.
24.	6.	5.	*for* E*e*, read *Ee*.
33.	laſt but one,		*for* DQ, *read* NQ.
34.	1.	two laſt,	*for* D's, *read* N's.
46.	1.	3.	*for* Rule, *read* Ruler.
50.	1.	9.	*for* muſt, *read* may.
	2.	4. and 5. Bott.	*after* S, *read*, or R.
51.	5.	6. and laſt.	for *Fc, read cc*.
53.	4.	2.	*for* more, *read* leſs.
56.	3.	6.	*for* C, *read* O.
57.	2.	4.	Ditto. Note*; *for* CV, *read* OV.
		5.	*for* E, *read* F.
		laſt.	*for* BDE, *read* BDF.
58.		2.	for *b*, read *d*.
61.	4.	8.	*for* as, *read* or.
66.	2.	4.	*for* a1, b2, read *a* 1, *b* 2. Fig. 3.
	5.	5.	*for* NC, *read* MC.
67.	4.	2.	*for* B1, *read* B2.
71.	2.	2.	*for* CM, *read* cM.
72.		16.	for *do*, *read* d*o*.
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73.	3.	3.	*for* AC, *read* ac.
75.	5.	5.	for *BS*, read *BS*.
76.		3.	*for* abdf, *read* ab*b*f.
79.		1.	*for* GD, *read* GI.
83.	4.	7.	*read*, D will appear at d.
85.	2.	3.	Bott. *for* thoſe, *read* theſe.
87.	4.	laſt.	for *a c*, read *a b*.
102.	3.	laſt.	*for* Page 65, *read* 67.
124.	1.	5.	*for* right, *read* left.

In Page 74. Par. 3. L. 6. the Letter p having drop'd out, the word paſſes is rendered aſſes; and in the 94th Page, Lines 8. and 9. from the bottom; alſo, in Page 108. Par. 4. L. 2. an r is wanting in the word Tetrahedron (Tetraedon); in P. 104. Par. 3. L. 3. it is Tetrahedrion; and in Page 93. Par. 4. L. 5. is an, inſtead of on; which, being entirely literary, are not ſo liable to miſlead.

APPENDIX.

PREFACE

TO THE READER.

IT muſt appear ſomewhat ſingular and uncommon, to offer to the World an Appendix, to a Work which has never been publiſhed, otherwiſe than by delivering it to the Subſcribers; to ſeveral of whom, the firſt Impreſſion has been delivered four or five Years. The ſecond Impreſſion being, alſo, wholly diſpoſed of, by the ſame means, and upwards of a hundred ſtill are wanting, to ſupply the Subſcribers *, a third becomes immediately neceſſary, before it can be publiſhed to the World. As an Appendix was originally intended, being mentioned in the firſt Propoſals, and particularly in the Work, in ſeveral places, an Apology, for the delay, may reaſonably be expected †; as ſeveral have kept the Work unbound, on that account. Being mentioned in the Work, it has been noticed by the Critical Reviewers, and treated rather ludicrouſly (after ſome trifling Criticiſms on the Work) concluding in theſe Words; "To this Compleat Treatiſe on "Perſpective, we are informed, an Appendix is to be added." Something of the ſame ludicrous kind is alſo diſplayed, in reſpect of the Title; intimating the Vanity of giving that Appellation to Treatiſes, on various Subjects. I muſt own, that it does rather ſavour of Vanity; and is juſtly deemed ſo, when beſtowed on puerile and ill-digeſted Performances, as is ſometimes the Caſe. How far this Treatiſe merits the Title I have preſumed to give it, muſt now be left to the judicious and candid Reader; but, this I will venture to affirm, that, ſo far as is uſeful, or really neceſſary to the Artiſt, in delineating, the Subject is complete, both in Theory and Practice. Much more may and has been ſaid, in Theory, and that, with great judgment and knowledge, particularly by Mr. Hamilton; and yet, I have thrown ſome new Light on the Subject, which will make it clearer and better underſtood, in general, and chiefly, where it is neceſſary; inſomuch that, I will further ſay, if a thorough knowledge of uſeful Perſpective cannot be acquired from that Work, it never will.

Now, allowing this Treatiſe to be as perfect, or complete, as the Vanity of the Author can ſuppoſe it, there may not be ſo much impropriety in adding an Appendix to it, as the critical Gentlemen may imagine. For, I ſhall not ſuppoſe, but affirm, that every Rule, neceſſary for the delineation of regular Objects, that

* The ſecond Impreſſion conſiſted of a thouſand Copies.

† This Appendix was in hand when part of the firſt Impreſſion was deſtroyed, by the Fire in the Savoy (which impeded its Publication) and two of the Plates have been engraved three or four Years; but being obliged to ſet about reprinting the Work (as ſoon as I could) that, together with my Domeſtic Affairs (having loſt a moſt valuable Companion and Conſort) diſpoſing of my Family, and leaving off Houſe-keeping, and, being much from Home, prevented my going about to finiſh the Appendix ſooner.

is, all ſuch as are bounded by Planes, or regular curved Surfaces (no other are fit Subjects for Perſpective) are there not only given but applied; and that, in the brieſeſt manner, conſiſtent with perſpicuity, poſſible, with all the variety that can occur, in practice; and alſo, that every Rule is evidently and clearly deduced from an infallible Theory, previouſly demonſtrated; or, in the moſt conciſe manner, demonſtrated there. The Theory and Practice of Shadows, in general, of Light and Shade, with other matters neceſſary for perfecting a Picture, are alſo, fully and clearly, inveſtigated, in ſuch wiſe as to render the ſtudy thereof both intereſting and entertaining; calculated not merely for the Artiſt, but alſo, as a genteel and polite Accompliſhment to the Gentleman. What more can be neceſſary, to make the Work a Complete Treatiſe?

Yet, although the Subject of Perſpective is, there, fully handled, there are many intereſting Subjects, to which Perſpective is particularly applicable, not touched on; and, notwithſtanding the application of the Rules, given, are univerſal, yet there are Subjects, or Caſes, wherein Perſpective is moſt eſſential, that require a further elucidation, to diſplay it to advantage, particularly in the Theatre, which is much wanted. To repreſent a given Subject on various detached Pieces, ſo, as to appear, from a determined Station, as one Picture, requires more knowledge than, ſimply, the Rules of Perſpective to effect; to determine the true place of each Wing, what Object, or part of the Object, ſhould be repreſented thereon, and to proportion each to its Place, ſo, as to fall in and unite with the reſt, is what very few are converſant in, what none have treated on, with any degree of propriety; yea, I will be free to ſay, that it was not at all underſtood by ſome who have attempted it, and but very little by many who practiſe it, in Scene Painting.

There are many other Caſes, in which Perſpective may be advantageouſly diſplayed, which I have made the Subject of this Appendix; for, I did not conceive it neceſſary, or proper to be done in the Treatiſe, which abounds with Examples ſufficient to render the Rules of Perſpective familiar; to have multiplied them, there, had been ſuperfluous. There are alſo other Methods of Operation which were formerly in uſe, and are ſtill uſed, and which are worthy of notice, though not founded on geometrical Principles; thoſe I did not chooſe to mix with the other, as ſome have done, and made their Work merely a Parallel inſtead of a regular ſcientific Treatiſe; from the main Plan of which, Digreſſions are unjuſtifiable. The whole of the Matter, here given, is divided into nine Sections, the Heads of which are as follow:

The firſt Section of the Appendix ſhews how ſome of the old Authors, particularly Vignola, and Sirigatti, delineated Objects perſpectively; the great utility of theirs, and, in ſome Caſes, the preference of it to the new Methods; at leaſt, I have ſhewn how one may aſſiſt and facilitate the other. I have, alſo, in this Section, ſhewn and diſplay'd the uſe, and application, of an Apparatus for drawing, perſpectively, the moſt irregular and complicated Objects, of any kind (and that, without underſtanding Perſpective) by the aſſiſtance of which, the Landſcape Painter may take the moſt juſt Portrait of Nature; which, without Apparatus, or ſome mechanical Rule, he cannot, though bleſt with the moſt judicious Eye, and able Hand.

In the ſecond Section I have made ſome (I preſume uſeful) Remarks, on what, ſome term Military Perſpective (an unmeaning Term) which, in reality, is orthographical, the Eye being conſidered at an infinite diſtance. Secondly, on Birds Eye Views, of which, the former is a Species; as it ſuppoſes the Eye conſiderably elevated. And, thirdly, ſome further Remarks on horizontal Pictures.

In the third, I have advanced ſome further Obſervations on the Aſcent and Deſcent; ſhewing, clearly, the great Deception of Viſion, in thoſe Caſes, from Obſervations in Nature; illuſtrated with ſtriking Repreſentations of both, which (though not real Portraits) may frequently be obſerved. The remainder of this

Section is applied to round Objects, in general; pointing out the obvious and moſt glaring improprieties daily practiſed, by many, who do not conſider, with the leaſt degree of attention, their real and true Appearances.

The fourth Section is wholly applied to the Theatre; in which (I do not flatter myſelf, for) I am confident, will be found ſuch uſeful and neceſſary Inſtructions, for Scenery, and Scene Painting, as have never yet been given; being, at the ſame time, eaſily reducible to Practice, in every well conſtructed Theatre.

The fifth ſhews how the Rules of Perſpective may be ſucceſsfully applied to that moſt beautiful and elegant Object, a Ship, by thoſe who are well acquainted with its geometrical Conſtruction; a thing much wanted by Artiſts and others, in that line of Painting; but more particularly deſired by the ingenious Draftſmen, in all the Royal Dock Yards.

In the ſixth Section, I have ſhewn how far Perſpective is neceſſary to the Landſcape Painter; in which is particularly diſplay'd the excellence of the Principles of Brook Taylor's Perſpective; ſhewing the great utility of the elementary Rules, he has given, thereto; with ſome critical Remarks on Landſcape-Painting, in general.

In the ſeventh, I have given and explained a Method of delineating on curved Surfaces, any Subject given, with great exactneſs; a thing never, that I have ſeen, done before, to any purpoſe; with other Diſtortions, and Anamorphoſes, on plane Surfaces.

In the eighth, I have illuſtrated, and reduced to Practice, one of the moſt elegant Problems in Brook Taylor's firſt Eſſay, which I had either overlooked, or not conſidered with that attention neceſſary for the inveſtigation of ſo valuable a Problem, before; it is, to determine the Contour, or Perſpective Repreſentation of a Globe, from any Radius, perſpectively given. Secondly, I have ſhewn how to reduce the perſpective Repreſentations of certain Objects, to their original geometrical Figure, or Species; properly, inverſe Perſpective. And laſtly, I have illuſtrated, more amply than I had done before, the Doctrine of Reflections, on poliſhed plane, and other Surfaces.

The ninth, and laſt Section (by far the moſt copious) contains Criticiſms on all the Engliſh Writers on Perſpective; the Errors, which ſome of them (in repute) have run into, are pointed out, and their Excellencies candidly diſplay'd. This Section may be conſidered as a Parallel of the modern Authors; as the firſt is, in ſome degree, between the Antients and Moderns.

This is a Plan of the Appendix; which, probably, may be thought, by the critical Gentlemen, Matter ſufficient for an entire Work; but, if they will condeſcend to conſider the Subjects here treated on, with candour, I am of opinion, they will not ſee much impropriety in propoſing an Appendix; not as neceſſary to a further elucidation of the Principles given before, or to render the application of the Rules, deduced, more facile; or (as is uſually the Caſe) to ſupply ſome Omiſſion; but, in order to diſplay ſuch particular Subjects as could not, with propriety, be given in the Work; being conſidered, in itſelf, complete, as a regular Syſtem of Perſpective, neceſſary to the Art of Delineating; theſe being particular Subjects, to which Perſpective is applicable, and neceſſary to be well underſtood.

SECTION I.

Containing a brief HISTORY of PERSPECTIVE; with the Methods of Practice, uſed by the ANTIENTS.

WHEN I firſt ſet about this Appendix, it was my intention to write a more copious Hiſtory of the riſe and progreſs of Perſpective; but, in reality, my time, ever ſince, has been ſo taken up otherwiſe, that, finding great difficulty in obtaining the neceſſary information for ſuch an undertaking, and, conſidering that the advantage reſulting from it, to the generality of Readers, would in no wiſe compenſate for the loſs of Time that might be ſpent in the enquiry, I ſhall content myſelf with, and doubt not my Readers will be ſatisfied, in giving the beſt account of its Origin, which I am, at preſent, in poſſeſſion of; and employ my Pen in what, I am confident, will be found more intereſting to all who are pleaſed with, or real admirers of the Subject.

When or where Perſpective was firſt practiſed, or by whom, or, who was the firſt that wrote on the Subject, I ſhall not take upon me to aſcertain. He who firſt drew from, or copied Nature, was the firſt who drew perſpectively, though probably not the firſt who practiſed drawing by rule; nor perhaps were thoſe, who drew the beſt, capable of writing on the Subject. The low ebb in which we find Perſpective, a Century ago, evinces the ſlow progreſs of that Art (for it was not, at that time, brought to a Science) although Geometry was as perfect, and as well known to many, then as now; yet had they little or no Idea of applying it to Perſpective. Notwithſtanding ſeveral Books, in Italian, in French, and other Languages are extant, few, that I have met with, are worthy of notice; that by Jacomo Barozzi da Vignolo, in Italian, printed at Rome, in 1644, ſeems to be the moſt valuable and uſeful Work, on Perſpective, that has fallen in my way, of ſo early Date, from whom, it is ſaid, Sirigatti borrowed his Method. Indeed there is ſuch uniformity among the reſt, that we may conclude they borrowed from one another; but all of them, in general, are without any leading Principles, by which, the Rules made uſe of may be inveſtigated; indeed they can ſcarce be called Rules, but Method, being, merely, a mechanical Proceſs, dependant on no Principle.

Vitruvius informs us, that Agatharcus, cotemporary with Æſchylus who exhibited a Play at Athens, was the firſt who drew a tragic Scene, and that he left ſome Notes concerning it; which, ſome time after his Death, induced Democritus and Anaxagoras to write on the Subject; as it is rather conjectured than aſſerted by Diogenes Laertius; becauſe, being able Geometricians, he concludes them equal to the Subject; but that does by no means follow, ſeeing that, Geometry has long been known, and well underſtood by many, who, though they applied it, learnedly, to various other Subjects, yet made no application of it to Perſpective. If that Concluſion can with certainty be drawn, we may conclude alſo that Euclid and others were verſed in Perſpective; eſpecially, as they left ſome Elements of Optics to the World, which have a tendency thereto, and from which, Perſpective might, in ſome degree be deducible. There is no doubt but it might, as being an optical Science; yet is by far more dependant on Geometry than Optics; which is ſupported more by Experiment than by Geometry.

Geminus, the Rhodian, an eminent Mathematician, who lived in the time of Cicero, wrote on Perſpective; which, if we may credit Lomazzo, he divided into three Parts; viz. Viſion, or Perſpective; Sciography, or the doctrine of Shadows;

and Specularia, or Reflections; and which ſeems, as he informs us, deſigned for the practice of Painters; the firſt part being divided into phiſiological and linear. Unfortunately, the Writings of Democritus and his Cotemporary, Anaxagoras, are no longer extant; nor am I clear, if the Works of Geminus are in being, at this time.

Among the Romans, Pliny relates that, in the Plays given by Claudius Pulcher, the Repreſentations of Houſes, on the Scenes, were ſo very accurate, that the Crows, a Bird of great ſagacity, were ſo deceived in the Appearance, as to endeavour to alight on the Roofs. But ſurely, we cannot infer, from thence, that they were Maſters of Perſpective, who drew the Scenes (for he does not inform us who) the truth of the Lines was not at all neceſſary for deceiving the Crows; the colouring and imitation of the Slates or Tyles is all that was neceſſary thereto. The Roman Crows were perhaps leſs ſagacious than that ſpecies of Birds, in England; which ſeldom, I believe, attempt to come ſo near Houſes, but chiefly alight on Trees, or on the Ground.

It is alſo related, that a Dog, being deceived by the Appearance of Steps, in a piece of Perſpective of Dento's, and imagining that he ſhould find a paſſage up them (probably being purſued) he made up to them in full ſpeed, and daſhed his Brains out, againſt the Wall; and thus, by his Death, immortalized the Artiſt. Now I cannot ſuppoſe, that the Deception aroſe merely from the Steps, but from the Appearance of a continuation of the Building; or, of ſome avenue to other Apartments, up Steps; beſides, a very ſmall knowledge in Perſpective is ſufficient for delineating a flight of Steps, nor was great accuracy at all neceſſary to the Deception; but, more, the effect of Light on them, and the force of Shade. Whether thoſe Steps were at the outſide of a Building, or internal, is immaterial; for in reſpect of Steps, ſimply, a ſtrong Deception may be ſeen, in the Garden belonging to White-Conduit-Houſe, at the far end. Being in the Garden with two of my Boys, who, from their acquaintance with Perſpective, were not ſo liable to be deceived as a Dog; yet both ran up to them, in expectation that they were real, and I own that I was alſo deceived; yet I do not imagine that the Painter of thoſe Steps is in any danger of being immortalized, or his Name ſo much as ſpoken of by Poſterity, unleſs he has performed things more extraordinary.

That Perſpective was taught in the famous School, which Pamphilius eſtabliſhed in Sicion, to Apelles and other Diſciples of that great Maſter, in the time of Alexander; and practiſed, nearly in the ſame manner, by thoſe great Luminaries, Titian, Raphael, and others of thoſe times, I have not the leaſt doubt; but muſt own, that I cannot ſuppoſe it was ſo well known to the Greek and Roman Painters, in thoſe early times, as ſome imagine; ſo as, in the age of Pericles, to be reduced to a complete Science, laid down in Theorems, from certain Data, or Poſtulate. If it had, I cannot conceive that it ſhould be ſo entirely loſt, in the Deluge of Gothic Barbariſm which overflowed the World of Science and the fine Arts, in the Weſtern Empire, that no traces of it were to be found. Although ſuch an Inundation of Ignorance might greatly debilitate and damp the ardour of its Votaries, I cannot ſuppoſe that it would wholly extinguiſh every ſpark of Science, and genius for the imitative Arts; it does not ſeem probable; for, ſurely, no benefit could accrue to the ravagers of thoſe times, in deſtroying all the Works of Art, Books of Science, and Men of Genius, that came in their way. It will ſcarce admit of a doubt, that the antient Greek and Roman Artiſts had ſome knowledge in, or rather, ſome Method of delineating Objects perſpectively; yet, it was long a Myſtery to the Moderns, after Painting began to revive among them; nor is it eaſy to fix the preciſe time, when they firſt ſet about applying themſelves to the ſtudy of it; but it is well known, that it had made but very little progreſs before the begining of the preſent Century.

Though we cannot aſcertain the Æra when Perſpective ceaſed to exiſt, or, more properly ſpeaking, to be cultivated in the Weſtern Empire, it is imagined that it was practiſed much later in the Eaſtern; for in the 12th Century, John Tzetzes ſpeaks concerning it, as if he was well acquainted with its importance to

Painting and Statuary. Alſo, the Greek Painters, who, in the 13th Century, were employed by the Venetians and Florentines, are ſuppoſed to have brought ſome optical knowledge with them, into Italy; for, the Diſciples of Giotto are praiſed for their adherence to Perſpective, early in the 14th Century, in which they far ſurpaſſed their Predeceſſors; inſomuch that, it ſoon made a conſiderable progreſs in Italy, the Lombards and Florentines applying themſelves to the improvement of an Art ſo neceſſary to Painting; and this was, at leaſt, a Century before the Eaſtern Empire was totally overthrown.

Amongſt the Authors who have treated on Perſpective, none is of more antient date than Bartolomeo Bramantino, of Milan, who publiſhed his *Regole di Perſpectiva*, &c. in 1440; he is mentioned by Lomazzo, in the fifth Book, with ſome account of his Method; viz. by the Line of Interſection, as in Vignola's firſt Rule.

Leon Battiſta Alberti, Painter and Architect, was one of the greateſt Artiſts that Age produced. In the account of his Life, which is annexed to his Works, we learn, that he wrote his Treatiſe *De Pictura*, in three Books, in which he treats chiefly of Perſpective, in 1450.

Baldazzare Peruzzi, of Siena, Geometrician, Painter, and Architect, was born in the year 1481, and applied himſelf to the ſtudy of Perſpective; from whom, Sebaſtian Serlio learned his Method, which he publiſhed in Italian, in 1540.

This Work was tranſlated into Dutch, and from that into Engliſh; in which Language, it was printed in 1611; and again, with Copper-Plates, in 1657.

Commandine, in his Comment on the Planiſphere of Ptolomy, publiſhed by him, in Latin, in 1558, diſcuſſes the doctrine of Perſpective.

Pietro Cataneo, of Siena, in his Book of Architecture, printed in 1567, frequently reprehends Serlio; whoſe Method for determining the Repreſentation of a Square, on the Picture, was by drawing Lines from the extremes of the given Side on the Picture, to the Center, and interſecting one of them, by another, drawn to the Point of Diſtance; than which, if the diſtance of the oppoſite Side, from its Seat, be properly applied, no better Method has, ever ſince, been found, nor ever can. But, in that, he is not conſiſtent; for, his firſt Diagram is erroneous; yet, he ſays it is the perfecteſt Rule, and may be proved by a Line in it which is falſe; this Line he omits, in the next, as ſuperfluous, and is therefore true. The Method he gives, in preference to Serlio, is that uſed by Bramantino, and Battiſta Alberti, by the Line of Interſection (which I ſhall explain hereafter) and this ſeems to be done in oppoſition to Serlio; as heretofore, Mr. Ware oppoſed Kirby, and with the ſame Method.

Daniel Barbaro, publiſhed a Work, on Perſpective, in 1569.

Some few more are mentioned in a Catalogue of Authors, who have treated on Architecture and Perſpective, towards the end of a laborious Work, entitled the *Abecedario Pittorico*; whom I ſhall paſs over, and ſpeak of the celebrated Architect, M. Jacomo Barozzi, of Vignola*; by whom, a Treatiſe was written, in the year 1583, entitled, *The Two Rules of Perſpective*; printed in Italian, at Rome, and publiſhed by Filippo de Roſſi, with Annotations by Egnatio Danti, Math. Prof. in the Academy of Bologna, in 1644, which Work is now before me, and is worthy of Notice.

Salomon de Caus, *Ingenieur* to his ſerene highneſs Henry Prince of Wales, and Duke of Cornwall, publiſhed a Work in French, printed in London, in 1612; entitled, *La Perſpective, avec la Raiſon des Ombres et Miroirs*, which is not without Merit. His Method is almoſt wholly confined to the Line of Interſection, as by the Authors mentioned above, in which he has laboured more than any of them, having dared to attempt a Corinthian Entablature and Capital, which is tolerable; he has alſo a piece of Fortification, a pentagonal Baſtion, an intricate and puzling Object, and laborious to the laſt degree. Here are flights of Steps, a Garden, a Fountain, a Draw-bridge, and the Inſide of a Room, in the ſtile of that Age, with its Furniture, belaboured after the ſame Method; alſo a Guittar; but the Annulus and Sphere are beyond human patience, to go through the Proceſs. The Shadow

* This Author is generally called and known by the name Vignola, the place where he was born.

of

of the Neck of the Guittar, on a Table (to the Plane of which it is parallel) is not truly repreſented; for, in the poſition it is given, the Shadow would be parallel to the Object, with which it makes a conſiderable Angle. In the 8th and 19th Plates, he ſeems to have ſome notion of a Point of Sight and Diſtance, but without a Line for the Horizon. His projection of Shadows and Reflections have ſomething worthy of notice in them, though performed by the former mechanical Proceſs. He criticiſes on Sirigatti, for not repreſenting a Globe properly; who publiſhed a folio Work, in Italian, in the Year 1596; which Work he calls the Child of his own Brain; but, in reality, is no other than the firſt laborious Method, by Vignola; deſcribed alſo by Cataneo, and Bramantino, in which he has not made the leaſt Improvement.

Indeed it is not improbable, that, notwithſtanding others had publiſhed the ſame Method, many Years before him, it might be of his own Invention. I judge from Experience, having, myſelf, formerly, fallen into that Method, before I was acquainted with any but the Jeſuit; merely from the ſmall knowledge I then had of Lines, geometrically; which I applied to Mouldings parallel to the Picture (as in Ex. 15. B. 3.) ſucceſsfully; for, at that time, I was not verſed in oblique Poſitions of the Object, which cannot be attained from the Jeſuit, or any of the old Authors. And I am of opinion, that the ſame Method was firſt practiſed by all the old Authors, both antient and modern; every old Work, of the later Ages, indicates and ſupports my opinion. The Proceſs is, by having the geometrical Plan and Elevation, or Orthography of the Object, correctly drawn; then, the Station being determined, that is, a Point being aſſumed, at a proper diſtance, in proportion to the Scale of the Drawing, or Plan, in the poſition it is intended to be ſeen; and, the place and poſition of the Picture being determined on, which is generally parallel to ſome Face of the Object, a Line is drawn, repreſenting its Interſection with the Ground, or other Plane, on which the Object is ſeated; all which, will be better underſtood by an Example.

Let Fig. 1. No. 1. Plate I. be the Plan of a right angled Parallelopiped, on the Ground, or other Plane; let F be the Station, from which the Object is intended to be viewed; and let the Picture be ſuppoſed to ſtand erect, on the Line LM, its Interſection with the Ground; uſually called the Baſe, or Ground Line. Then, Right Lines being drawn from every Angle, A, B, C, and D, of the Plan, to the Station Point, F, it is obvious they will cut the Line LM, at *a*, *b*, *c*, and *d*; and, conſequently, Lines, perpendicular to the Interſection, being drawn on the Picture, from the Points *a*, *b*, and *c*, will neceſſarily coincide with the perpendicular Lines of the Object, on the correſponding Points A, B, and C, of the Plan. Plate I. Fig. 1.

Let the Station Line, FM, be drawn perpendicular to LM, and let LM be produced; let GHIK be conſidered as the upright Face of the Object, ſtanding on FK, a Section of the Ground Plane; and, MN being conſidered as a vertical Section of the Picture, let EF be drawn parallel to it, i. e. perpendicular to FM, and equal to the height of the Eye. Then, the Lines EG, EH, &c. indicate Viſual Rays, which cut the Picture in the Points *g*, *h*, &c. and determine how high each Angle riſes on the Picture.

Being thus prepared, transfer the Points *a*, *b*, *c*, and *d*, to the Line FM, at a, b, c, and d, making ab equal to *ab*, bc equal to *bc*, &c. from all which draw Lines perpendicular to FM, as ah, ck, &c. and from the Points *g*, *h*, *i*, and *k*, draw Lines parallel to FM, cutting the former at g, h, i, k, l, m, and n, and joining hi, nk, and ml, the Figure is completed. The Lines hi, nk, and ml, being produced, will meet in their vaniſhing Point, E, which is the Point of View for that Object, aF being taken equal to *a*M; the Diſtance is EN.

Now, I cannot conceive any thing ſimpler, or eaſier to be conceived than this Operation, every Point being obtained by a mechanical Proceſs, and every Line geometrically drawn. To render it ſtill better underſtood, let the Plane EFMN, with the Object GI, be turned up, on FK, perpendicular; then, ſuppoſe the Picture (No. 3.) placed on the Interſection LM, ſo, that the Points a, d, b, and c coincide with *a*, *d*, *b*, and *c*, and OP will coincide with NM, and the parallel Lines *g*g, *h*h, &c.

Plate I. &c. will then be drawn on the Picture the contrary way, from NM parallel to ML, interſecting Perpendiculars from *a*, *b*, *c*, and *d*, as before from a, b, c, and d, which muſt be obvious; the Eye being at E will ſee the Picture (No. 4.) in the true Point of View, which will coincide with the Object at No. 1; and O will coincide with N.

I will now ſhew, by way of Parallel, how much more facile the ſame Figure is produced by the Rules of Perſpective; for this cannot be called a Rule, but a Method, by which the ſame thing is effected.

Fig. 2. In Fig. 2. let AD be the Ground Line; at pleaſure, take C, diſtant from AD, equal to the height of the Eye from the Ground (equal to EF, Fig. 1.) and draw EC parallel to AD. Make EC equal to the Diſtance of the Picture (equal EN, Fig. 1.) CD being drawn perpendicular, make BD equal to the Diſtance of the Object from the Station Line (equal BG, Fig. 1.) and make AB equal to AB, Fig. 1. that is, to the width of the Object, and draw AC and BC; then, Ba being made equal to B*d*, No. 1. and ab to BC, draw aE and bE, cuting BC, at *b* and *c*; draw *ab* parallel to AB, and deſcribe a Square, *adeb*; or, make the Rectangle *adeb* ſimilar to the original Figure, and draw *d*C and *e*C; *cf* being drawn parallel to *be*, and *fg* to *de* compleats the Figure, *agc*, ſimilar to No. 3, Fig. 1.

Or, if AFGB be made equal, and ſimilar, to the original of that Face; then AF is the Interſection of a Plane *adg*, which is not ſeen, FG of the top, and BG of the Face *befe*; the reſt is obvious, on inſpection.

On comparing theſe two Figures, the number of Lines neceſſary to the Proceſs of one, in reſpect of the other, I am perſuaded that no Perſon would heſitate which to give the preference to; to ſay nothing of the inaccuracy the former is liable to; ſo that, when there are a great many Lines in the Object, which ſhould tend to the ſame Point, it would ſcarce be poſſible to make them do ſo, without fixing the Point firſt, which is not neceſſary in that Operation; nor had they any conception of it, eſpecially when the Object is oblique, as in the next Figure; and, indeed, as it ought to have been in this, being properly repreſented.

Fig. 4. Let No. 1. Fig. 3. (which ſerves alſo to Fig. 4) be the Plan of a Parallelopiped, as above, the Diſtance, or Point of Station, is E, and IL is the Interſection of the Picture, or Ground Line, to which the Object is oblique; AE, BE, &c. being drawn, cut it at a, b, c, and d, which transfer to No. 3. to the Line FS. Then, the Elevation, at No. 2. muſt be drawn, according to the poſition it has to the Picture, thus; having drawn DFS, then transfer all the meaſures from EF*d* thereto, E being conſidered as the Eye, or Point of Station, in one, may be ſuppoſed to coincide with S in the other, over which E is perpendicular, and equal to the height of the Eye. SF being made equal to EF, Fig. 4. (the Diſtance of the Picture) draw FC perpendicular, repreſenting a vertical Section, and make FB equal to F*b* in the other, BK to *ba*, and *c*, and BD to *bd*; from which, draw Perpendiculars equal to the height of the Object, and draw IG. Then, to the Eye, at E, draw the Viſual Rays BE, GE, &c. interſecting CF, at *b*, *g*, &c. from all which draw parallel Lines, cuting perpendicular Lines from a, b, c, and d, at *B*, *G*, *k*, *h*, &c. and, joining k*B*, *Bk*, *Gh*, &c. the Figure is completed.

Fig. 4. Next, I will ſhew that the ſame thing is much eaſier effected by Rule, on the true Principles. Fig. 4. No. 1. is the Plan, in its true poſition, in reſpect of the Eye, at E, and the Picture at IL, on which it is ſuppoſed to ſtand; the Diſtance being EF. Let the Lines, i. e. the Sides of the Figure, DA, AB, &c. be produced, till they cut the Picture, at I, G, K, and L; and, from E, draw EI and EH reſpectively parallel to them, producing their Vaniſhing Points, I and H, IL being now conſidered as the horizontal, Vaniſhing Line. For, if the Picture be ſuppoſed to ſtand upright on IL, the Eye, at E, being raiſed out of the Plane, equal to ES, Fig. 3. and a Plane be ſuppoſed to paſs through the Eye, parallel to the Ground, cuting the Picture, thoſe two Planes will, in this caſe, coincide; and conſequently, the Horizontal Line is the ſame with the Ground Line; and EA, EC, &c. may be conſidered as Viſual Rays, appearing through the Horizontal Plane.

Theſe things being premiſed, take Gg equal to the height of the Eye, perpendicular to GL, and, at that diſtance, draw il parallel to it, on which, take gi, gk, and l, equal to GI, GK, and L; then, drawing gH, iH, kI, and lI, which, by their Interſections, give the perſpective Plan of ABCD, No. 1. Draw Perpendiculars from *a*, *b*, and *c*, and on Gg, ſet up the height of the Object, at J, and draw JH, cuting the Perpendiculars, from *b* and *c*, at *g* and *b*, from both which, draw Lines to I; and, where *g*l cuts the Perpendicular on *a*, at *f*, draw *f*H, interſecting *b*l at *i*, which completes the Figure; as at No. 3. Fig. 3. above.

In this Proceſs it may be obſerved, that the Lines EA, EB, &c. are of no uſe; but, by them, the correſpondence between the two Methods is obvious; the Perpendiculars from *a*, *b*, *c*, and *d*, exactly coinciding with a, b, c, and d; ab and bc determining the widths of the Faces AB, BC, on the Picture. The Repreſentations, on each Picture being compared, will be found ſimilar, in every reſpect; but it muſt be evident, that the Method, in Fig. 3. is not only more operoſe, but much more liable to Error, in the Proceſs.

N. B. The Line QR, in Fig. 1. is the true poſition of the Picture, in reſpect of the Plan at No. 1. perpendicular to the Station Line, FD, which biſects the Optic Angle AFC, under which it is ſeen.

This Figure may, to ſome, appear different from Prob. 21. Sect. 5. Book 3. and the Examples in the ſixth Section, on account of the Plan being inverted, above the Vaniſhing Line, being uſually below the Ground Line il; and, the place of the Eye (which is, here, at E) above the Vaniſhing Line. But, it ſhould be remembered, that, in ſhewing how to prepare the Picture, in the third Section, this is ſhewn to be the true poſition, and the other is inverted, for reaſons there given; for, it muſt be obvious, that if the Picture ſtood erect on IL, then, the Object ſtanding on its Seat (the Plan, No. 1.) the Eye being elevated, at E, equal to Gg the given height; the Picture, then, being truly placed, between the Eye and the Object, would exactly coincide with it, the Viſual Rays cuting the Picture in the ſeveral Points correſponding with their Originals. And it muſt alſo be obvious, that if the Plan was inverted, that is, turned over, on IL, and, in that ſtate, brought down below il, the ſeveral Points, I, G, K, and L would be tranſpoſed to i, g, k, and l; and, if the Triangle lEH be alſo turned over on IH, above the Vaniſhing Line, then would EI and EH be ſtill reſpectively parallel to the Sides of the Figure, and the Vaniſhing Points would be the ſame.

It is alſo ſhewn, in the 21ſt Problem, that there is no neceſſity for the original Figure being drawn; the Seat of the hither Angle being given, on the Picture, with its diſtance from its Seat, together with the Inclination of the Sides of the Figure to the Picture, their Meaſures being known, is all that is wanted. But, if a geometrical Plan of the Object be already drawn, on any other Paper, the poſition of the Picture, and the Station may be determined; or rather, the Station being determined, the Poſition is a neceſſary Conſequence; as it is ſhewn, in the Preliminary Obſervations, Art. 4. Sect. III. the Diſtance of the Picture being at diſcretion, the Scale of Proportion, for the Drawing, will be according to it, and the Interſecting Points will be found nearer together, or farther aſunder, as the Picture is nearer to or farther from the Object.

Fig. 5. No. 1. is a regular Pentagon, S the Station from which it is viewed, gH is the Interſection, or Ground Line, and SHd, perpendicular to it, the Station Line; the Right Lines SA, SB, &c. determine the apparent place of each Angle, in reſpect of the Station Line, and the width of each Face, on the Picture, if the Object be a perpendicular Priſm; as ab of AB, bc of BC, and ag of AG. Then, to determine how high each Angle riſes on the Picture, make SE (perpendicular to SH) equal to the height of the Eye, and produce gH; draw Aa, Bb, &c. perpendicular to Hd, and, from E, draw Lines to a, b, g, &c. cuting HF, at *a*, *b*, *g*, &c. which give the height of each Angle, reſpectively; then, having transferred the Meaſures from gH to SH, at *c*, *b*, *d*, &c. from all which, draw Lines perpendicular to SH, and from *a*. *b*, *g*, &c. on FH, draw Lines parallel to SH cuting them, and join *AB*, *BC*, &c. which complete the Figure; as at No. 2; for which, E is the Point of View, S*c* being made equal to Hc. Fig. 5.

Plate I. If the Reader be desirous of seeing a Parallel to this Figure according to the new Principles, I refer him to Prob. 23. Sect. V. of my Treatise; in which, he will readily perceive the Excellence of the Rules there given, and effected by means of Vanishing and Interfecting Points. That this Method is simple, and adapted to the most ordinary Capacity, is certain; such as, one might reasonably conclude, would first be suggested, by all who set about to think of a Method of projecting Objects perspectively, by Rule, before he was acquainted with any, for that purpose; but how far it is excelled, by the Rules now in use, must be obvious to all who have practised both.

Although this Method of Vignola's, or Sirigatti, is, of itself, extremely laborious and tedious, yet, with its Assistance, the Process may be considerably abridged and expedited. If a perspective Drawing of a Building, externally, be wanted, it is necessary, first, to determine a Station, from which, the Object makes the most pleasing Picture; which being determined, a rude Sketch of it, with the Measures annexed to it, is all that is necessary, in order to project it, truly, by the Rules of Perspective; the Distance, and Position of the Picture being ascertained, and the Inclination of some Face of the Object thereto; and which, I must own, is not easily done, without a correct Plan of the Building. Now, a correct Plan is essentially necessary to be drawn, before we can proceed by Sirigatti's Method; and, considering it is but the bare Outline that is necessary, there is no great labour in drawing one; which being done, all the other Preliminaries are easily settled. But it is not necessary to be on the same Paper with the intended Picture, as it has been done here; it is better on a separate Sheet, and, provided it be not too small, may be by any Scale; for, if it be less than the Scale intended for the Drawing, the Lines, being produced beyond the Plan, may be extended to any Dimensions; as in Ex. 15. Sect. 7. Book 3. Fig. 85. of an Entablature. The Station being first determined, if the Building has any deep Recesses, the bearing of the hither part on the other is easily marked, from which, the Station Line is determinable in the Plan; on which the Distance must be set off, and the Position of the Picture is also determined. I shall illustrate it by an Example.

Fig. 6. Fig. 6. No. 1. is the Front of the Plan of a Building, and S is the Station from which it is intended to be drawn; the Bearing of the hither external Angle F on the Window at M, sufficiently indicates the Station to be somewhere in the Line FS; the distance from A or F, determines where. This being premised, from the real Building, we now refer to a Plan, on Paper, for which the outline, only, is needful, in order to determine the position of the Picture. From M, or as near to the Corner as the Angle F appeared to cut it, draw MF, and produce it, at discretion; and, by a Scale of the proportion the Plan is drawn to, set off AS, or FS, equal to the measure of the Distance intended, or measured, and draw BS; and RS, from the extreme of the End AR, which runs out of the Plate; bisect the Angle BSR, by the Right Line SC, which is the Station Line, to which, the Picture (PQ) must be perpendicular; C is its Center, and SC its Distance; and FAC is the Inclination of the Front, to the Picture.

PQ, it is manifest, is the true Position of the Picture, from the Station S, for the Object at No. 1; the Center, or Point of View, being in the middle, and consequently, each Extreme is seen under equal Angles; in which position, it deviates the least possible from a portion of the Circumference of a Circle, described on S with the Radius SC; whereas, a Picture parallel to the Front of the Building will subtend an Angle more than double BSR, which is the least possible, from the Station S, about 35 Degrees; in which case, the Distance is considerably more than the width of the Picture, as it is advised in the Preliminary Observations never to be less, seeing it is productive of Distortion.

For a parallel Picture, as D*B*, SD is the Station Line, which always bisects the Optic Angle; consequently, D being its Center, the Optic Angle is double BSD. The Process for delineating a perspective Plan, according to this Position, is the same as the foregoing Figure; the Intersections of the Lines AS, FS, &c. being marked

marked with correſponding Letters, on *BD*, may be transferred to DS, as at No. 2. Then, drawing SE perpendicular, and equal to the height of the Eye (which is, here, for want of room, inverted, in reſpect of the preceding Figures) and, producing FA, KL, and HN to the Station Line, cuting it at a, b, and c, draw Ea, Eb, and Ec, cuting D*B* at *a*, *b*, &c. from which, draw parallel Lines, cuting Perpendiculars, at *A*, *F*, &c. No. 2. which, being properly joined, by Right Lines, complete the Plan, in that poſition of the Picture, for which, E is the Point of View; as all the Lines which repreſent AR, FN, &c. (being perpendicular to D*B*) neceſſarily vaniſh there (Cor. Theo. 4.*) which, being known, facilitates the Operation, greatly, and is more correct.

For the inclined Picture, PQ, the ſame Lines, FS, BS, &c. cut it alſo, in the correſponding Points, which may be transferred to A*B*, No. 3. Then, SC being the Station Line, draw SO perpendicular to it, equal to the height of the Eye; and, from every Angle of the Plan draw Lines perpendicular to SC, cuting it, as in the Figure, from all which draw Lines to O, cuting CQ, which is now conſidered as a vertical Section, being parallel to SO; as may eaſily be conceived, by ſuppoſing both to ſtand upright on the Paper, at the Points S and C. As A*B* (No. 3.) is not in the Line CS (but, for conveniency, may be placed any where) parallel Lines cannot be drawn from the Diviſions on CQ; but, as is more uſual, the meaſures C*r*, C*b*, and all the intermediate ones, muſt be transferred, with Compaſſes, to the Perpendiculars on A*B*, reſpectively, particular care being taken to apply thoſe which correſpond. By joining thoſe Points, properly, by Right Lines, as in the Figure (No. 3.) the Plan is completed.

This Operation may, and I know it will, at firſt, appear intricate; and perhaps more ſo, on account of the meaſures, both for the Ground Line, and vertical Interſection being on the ſame Line; which, it may be obſerved, is the ſame in Fig. 1. and 5. but inverted, and therefore do not interfere with each other; and alſo, on account of the two Pictures, or Poſitions being together, yet are very diſtinguiſhable, and eaſy to be ſeparated, ſo as not to miſtake one for the other; for, it is not to be ſuppoſed that, in practice, there would be occaſion for both, at the ſame time. Although in all the Books which treat on this Method, in a complicated Plan, there appears the greateſt confuſion of Lines imaginable, yet the difficulty is by no means ſo great as it appears; for, by taking all the principal Parts firſt, and the intermediate Diviſions after, the Proceſs is not ſo perplexed; for otherwiſe, if all the Lines are drawn, and remain altogether, it would be almoſt impoſſible to diſtinguiſh one from the other. At any rate, to delineate a complicated Object, entirely by this method, without making uſe of Vaniſhing Points, is too much for human patience; but, with the mutual aſſiſtance of each other, the Proceſs is abridged, conſiderably.

As it is abſolutely neceſſary to have a geometrical Plan of the Outline of a Building, which has various Breaks and Recedings, and Inclinations of the Faces, in order to determine the true Poſition of the Picture, and aſcertain the Vaniſhing Points, &c. which being obtained, the places of every Angle of the Building, the Windows, Doors, Steps, &c. are all transferred to the Picture, by fixing a Pin in the Station Point, and applying a Ruler to the ſeveral Angles and Apertures in the Plan; and drawing a few of the principal Lines, the intermediate parts may be marked with a Pencil only, which diſtinguiſhes them better, than by drawing Lines from every one; and, when ſome parts are obtained, the Marks, or Lines may be rubbed out, if they interfere with others, that are wanted. The true Places and Diameters of Columns, with their exact Diminutions, and Intervals between them, together with the Angles of the Plinths of their Baſes, let the poſition of the Picture be what it may, are accurately obtained, beyond any other means whatever; in ſhort, the true place of every Part, on the Ground Plan, are the beſt and readieſt acquired by this Method; but, the parts which are elevated would, on a Picture, to which the Object is obliquely ſituated, be an endleſs trouble to determine, ſolely by the ſame means.

* In the firſt Impreſſion, it is the fifth Theorem.

Fig.

Plate I. Fig. 7. Fig. 7. is a Perſpective of the Building, on the parallel Picture; in which, every Angle is of equal height, in front, and the Windows are between parallel Lines; that is, the Fronts are geometrical, and ſimilar to the Originals, as well as to each other. In order to obtain the height of the receding Parts, an Elevation muſt be drawn, as in Fig. 1. or it may be done without, thus; to determine the height of the Angle at H, (Fig. 6. No. 1.) A Perpendicular, from H, cuts the Ground Line at c; ſuppoſe the height of the Building equal to cN; apply a Ruler to E and N, and mark the place where it cuts the Picture D*B*, as at *f*, make *HI* (Fig. 7.) equal to *cf*, and join *IK*, as in the Figure; by the ſame means the height of any other Line may be obtained. But, having determined the Point of View, or, more properly, the Center of the Picture, as here, at D, and ſince all the receding Lines tend there, the other Proceſs, by a geometrical Elevation is unneceſſary; ſeeing that, a Line from *K* to D cuts a Perpendicular from *H*, at *I*, the true height of that Angle.

It is not neceſſary to ſay more, in reſpect of the parallel Picture, which, indeed, was the only mode of drawing, perſpectively, in thoſe Times. Fig. 8. is the ſame Object, on a Picture properly ſituated; as on PQ, Fig. 6. in which, the Ground Plan is the ſame as No. 3. below; the Ground Line is A B, anſwering to A*B*, below; from which, all the Angles of the Building are drawn, perpendicular.

Fig. 8. In this Figure, becauſe the Angle A touches the Picture PQ (Fig. 6.) A a, which repreſents that Angle on the Picture, has its full geometrical height, in proportion to the Plan. To determine the heights of the parts which recede, according to this Method, a geometrical Elevation muſt be drawn, according to its ſituation with the Picture; or thus, for the Angle B; Bb being drawn perpendicular to SC, ſet off, from b, the height of the Building bB, and draw BO, cuting the Picture at Q; make Bb, Fig. 8. equal to CQ; and if on bB the heights of the Windows, &c. are ſet off, and Lines drawn to O, CQ will be divided in the ſame proportion, which muſt be transferred to Bb, Fig. 8. The Diviſions on the two extreme Corners of the Building, for the Windows, &c. being thus obtained, and being all of the ſame height, on each Story, joining thoſe Diviſions by Right Lines, and Perpendiculars being drawn, give the places of the Windows in each Pier; and it is manifeſt, that if the two Extremes be divided proportionally, the Lines which join them will tend to the ſame Point with A*B*, on the Ground, and ab, at the top of the Building.

All the other Angles muſt be determined after the ſame manner; as Hh, by a Perpendicular, at h, Fig. 6. but, how much the Proceſs is facilitated, by means of Vaniſhing Points, will ſoon be perceived. Having drawn the horizontal Vaniſhing Line, and determined the Vaniſhing Points, as at Fig. 6. SP being parallel to the End of the Building determines one, at P, the other is where SE, being produced, would meet PQ produced; or it will be diſtant from C, a third Proportional to PC and SC. The centre of the Picture being fixed at C, Fig. 8. diſtant from the corner A a equal to AC (Fig. 6.) on the Horizontal Line; make CP equal to CP, P is the vaniſhing point of all the lines parallel to AR, the other is out of the bounds of the Picture, determinable as above. Now, let the places of all the Angles of the Building, which are in ſight, be determined as at Fig. 6, on PQ and transferr'd to AB. Fig. 8. at A, F, &c. from all which draw perpendicular lines indefinite; and Aa being made equal to the known or determined height of the Building, draw Lines to the Vaniſhing Point of the Front from each extreme, cuting the Perpendiculars, at f, g, and b, the reſpective height of each; the Windows, in thoſe Piers, are obtained by the ſame means. The Diviſions, for the blank Windows, in the returning Face, being alſo determined on *GH*, and perpendicular Lines drawn from each, *G*P, gP, &c. being drawn, cut them in their reſpective heights, and determine the Angle *H*h; through each extreme of which, and the Diviſions thereon, Lines being drawn to the Vaniſhing Point of the Front determine the height of the Windows in the Receſs. To perform all this by Sirigatti's Method is not only tedious but liable to error; by Vaniſhing Points there can be none, being truly determined.

To

To obtain the Diviſions of the two Piers, perſpectively, the diſtance of the Vaniſhing Point of the Front muſt be laid down on the Horizontal Line, as at D, and the true geometrical meaſures ſet off, from A, on the Ground Line, at F, G, &c. from which, Lines drawn to D give the Points F, *G*, and *B*, but not always ſo accurately determined as the other, on account of their interſecting *AB* obliquely; for, when the Horizon is very low, or the Diſtance of the Building from the Picture conſiderable, the obliquity is ſuch, that the Points of Interſection cannot be aſcertained; in which caſe, recourſe muſt be had to an extra Plan, at a greater diſtance from the Horizon; ſo that, in many reſpects, the method of determining them, as above, is by far the moſt accurate and eligible; and, particularly, in reſpect of Columns and other detached parts of the Building, with many Minutias, which to obtain with exactneſs, recourſe muſt be had to a geometrical Plan.

Thus, I preſume that I have ſufficiently evinced, not merely by Words, but by Example alſo, that the Method of projecting Objects perſpectively, as by Sirigatti or Vignola, is not to be deſpiſed, and rejected; but, in many caſes to be preferred, when it tends to facilitate and expedite the Proceſs; and when, by means thereof, the Parts are more accurately determined. I muſt not omit taking notice of a Circumſtance in the 28th Plate (the Queen's Palace) which is, I find, a Paradox to ſome Perſons, viz. that the Center of the Picture (improperly called the Point of Sight) ſhould be in the Front of the Building, the End being ſeen. If proper attention be given to Fig. 6. I am perſuaded that the Myſtery will ſoon vaniſh. At the Station S, it is evident that the End, AR, of a Building, on the Plan, No. 1. would be ſeen; and conſequently, the Center cannot fall on the Front, the Picture being parallel to it, as D*B*; for it is at D, the diſtance of *A*D from the Corner, for that Picture. But, on the Picture PQ, the Center is at C, for SC is perpendicular to it; which, being produced, falls on the Building at L, and yet the End remains viſible, as it neceſſarily muſt, to a Perſon ſtanding at S. D is the Center of the Picture Fig. 7. but C is the Center or Point of View for the other Picture, Fig. 8. yet the End of the Building is equally ſeen, in both.

Thus much for the firſt of the two Rules, by Vignola; for the ſecond, ſuffice it to ſay, that it is the ſame, in every reſpect, as the Jeſuit's. It conveys a very juſt Idea of the Horizontal Line and Point of Sight, alſo of the Diſtance taken therein; by means of which two Points every thing is effected, in the ſame manner as on the true Principles, at this time, reſpecting right angled Objects, having one Face, or Side, parallel to the Picture; for which, the firſt Propoſition, in his Theory, ſeems well calculated, which, is the leading Principle: It is as follows. In every Triangle, ſituated between two parallel Lines; (more properly thus) a Right Line being drawn through any Angle of a Triangle, parallel to the oppoſite Side; if two Points be taken in the upper Parallel (that is, which paſſes through the Angle) equally diſtant from the Angle of the Triangle; and, if there be drawn two Lines from the oppoſite Angles, at the Baſe, cuting the Sides of the Triangle, a Line being drawn through the Interſections ſhall be parallel to the Baſe.

Conſtruction. In the Triangle ABC, * let DE be drawn through the Angle A, parallel to the Baſe, or Side ſubtending the Angle A, i. e. to BC, and let two Lines (BE and CD) be drawn, to the Points D and E, equidiſtant from A, cuting AB and AC at F and G; a right Line, FG, being drawn, will be parallel to BC. Fig. X.

Demonſtration. Becauſe DE is parallel to BC, the Triangles ADF, FCB are ſimilar; conſequently, AF : FB :: AD : BC (Eu. 4. 6.) and, for the ſame reaſon, AG : GC :: AE : BC, the Triangles AEG, GBC being ſimilar. But, AD is equal to AE; wherefore, AD : BC :: AE : BC; and conſequently, AF : FB :: AG : GC; therefore, FG is parallel to BC. (Eu. 2. 6.)

Although this Theorem is neither more nor leſs than the 2d of the 6th Book of Euclid, yet the manner of inveſtigation, here uſed, is very ingenious, and extremely well calculated to ſerve the purpoſe intended, in Perſpective. For, conſidering BC

* This Figure, for want of room, in the Plate, is inverted.

Plate I. as the Side of a Square parallel to the Picture, and DE the Horizontal Line; the Vertex A, of the Triangle, may be considered as the Point of Sight (properly, the Center of the Picture) and the Points D and E its Distance, laid down on the Horizontal Line; consequently, BFGC represents a Square, having one Side parallel to the Picture, seen at the Distance AE; E being the true place of the Eye, transposed to the Vanishing Line of the Horizon, or D; and consequently, they are the Vanishing Points of the Diagonals, BG and CF, as A is of the Sides BF and CG.

In this single Theorem, a foundation is laid for the whole Theory, in Vignola; and, indeed, for projecting Objects in all common Cases, being parallel and perpendicular to the Picture; i. e. the Lines in the Objects being so situated. And, for Figures which are obliquely situated to the Picture, they are determined by the same means; that is, by drawing Lines, from every Angle, perpendicular to the Interfection, or Base Line; and, seting off its Distance, on the Base Line, a Line is drawn to the Point of Distance, cuting the former in the Point sought. By this means, every Angle of the Figure is determined on the Picture; and, being joined by Right Lines, produce the Figure without having recourse to Accidental Points.

The Theory of this Author is very copious, consisting of forty-three Propositions, fourteen of which are Problems; but the whole is Geometry rather than Perspective; several of which are the same as in Euclid, others are somewhat varied; and, in general, judiciously chosen. For instance, the first, from which there are seven or eight more, that might be Corollaries to it. The 17th. If there are several Triangles having a common Vertex, the Bases (or Sides opposite) being equal and parallel; that whose Base subtends the greatest Angle has the least Sides.

This is deduced from the 21st B. 1. of Euclid (the 14th of mine) from which I have deduced a Corollary nearly similar to this, entirely on account of its utility in Perspective, which I frequently refer to.

The 21st is a very notable one, viz. If a Pyramid be cut by a Plane, parallel to its Base, the figure of the Section will be similar to the Base. This is a Corollary deduced from the 25th 11 Euclid (Theo. 1st. B. 8. of mine) and is a most excellent Lesson in Perspective; for the Pyramid of Visual Rays, formed by any right lined Figure, or plane Solid, being cut by the Plane of the Picture, produces the perspective Representation of the Figure, or Object; and, being parallel to the Base of the Pyramid, i. e. perpendicular to the Axe of the Eye (which is also the Axis of the Pyramid) is the only true Picture, being similar to the apparent Figure, or Object; but being cut obliquely, the Section is dissimilar (of which, Vignola makes another Theorem, the 22d) that is, the more oblique the Section of the Rays is made, by the Picture, the more distorted is the Representation thereon.

Theorem the 8th has something pertinent in it; viz. Whenever the Distance is taken less than the height of the Eye, the gradated Sides of a Square (i. e. seen perspectively) may be either equal to, greater, or less than the real Side; which is thus demonstrated.

Let DF be a vertical Section of the Picture, E the Eye and DE its Distance.
Fig. Y. If EA be drawn so, that DG is greater than DE, the Distance; then, because DE is parallel to CF, the Triangles DEG, GAF are similar; wherefore, FG : FA :: DG : DE. But DG is greater than DE, therefore, FG is greater than FA.

Again; let EB be drawn so, that DH is equal to DE; then, the Triangles DEH, HBF are similar, wherefore, FH is to FB, as DH to DE; i. e. equal.

Lastly; let EC be drawn so, that DI is less than DE; consequently, from the reasoning above, FI is less than FC. But, if AF, BF, and CF, be considered as the Sides of Squares, FG, FH, and FI, represent their respective depths, or recedings on the Picture, which are either greater, equal to, or less than the Originals; i. e. than the given Sides of the Squares, being parallel to the Picture. The next Theorem (when the Distance is either equal or greater than the height of the Eye, the receding Sides of the Square will rise less on the Picture than the given Side) might be a Corollary to the foregoing; from which it is easily deduced.

All the rest are, merely, Theorems, or Problems, in Geometry, save the 33d. the Figure for which is expressive, and seems to indicate a true Idea of determining the Center of the Picture, as the Vanishing Point of Lines which are perpendicular

to it. The Theorem itſelf is of no Conſequence; it is, if a Figure be parallel to the Horizon, the Eye not being in the ſame Plane, it will appear gradated; which is exceptionable; for, the Eye may be in a Perpendicular to the Plane of the Figure, in its Center, in which caſe, it will not appear gradated, though parallel to the Horizon. It is alſo partial; for, if the Axe of the Eye be inclined to the Plane of the Figure, i. e. if the Figure be ſeen obliquely, however it be ſituated to the Horizon, it will appear gradated.

Theſe Propoſitions are preceded by twenty-ſeven Definitions, and twelve Suppoſitions; the whole is illuſtrated with copious Annotations, by Egnatio Danti. But, what ſeems, to me, moſt extraordinary is, that in the delineation of a Cube (having a Face parallel to the Picture) the Points of Diſtance are placed in the Vertical Line, as well as in the Horizontal, and a proper uſe is made of them; i. e. as Vaniſhing Points of Diagonals in the receding vertical Faces of the Cube. The Figure before it ſeems to indicate how they are determined, by a Radial Line drawn from the Eye, parallel to them; although, in the Deſcription, it is not mentioned, as ſuch, nor, I believe, intended, (but to ſhew the optic Angle of the Picture) I think, there was no great Merit in determining, from theſe Figures, the Vaniſhing Points of Lines in general; in which, the Excellence of Brook Taylor's Perſpective chiefly conſiſts.

Seeing that this Author has advanced ſo far, towards determining Vaniſhing Points, in general, geometrically, I am ſurprized that he did not proceed one Step further, and perfect it; for, from the theoretic Diagrams, given in the Work, there ſeems to be nothing more wanting thereto, than drawing the diagonal Lines, from the Eye to the Points of Diſtance; which being done, their paralleliſm with the Originals was ſelf-evident; and it was alſo as evident, that if the Diagonals deviated from an Angle of 45 Degrees, whether more or leſs, that their Parallels, from the Eye, would, neceſſarily, determine their Vaniſhing Points. And it is ſtill more aſtoniſhing, that, for ſo long time after, none ſhould hit on ſo valuable an Expedient.

Thus much for Vignola, in whoſe Work, on Perſpective, there are no ſtriking Objects, effected with that unwearied labour, as in De Caus; for he prefers the ſecond Rule, the other being ſo exceſſive operoſe. The moſt extraordinary Plate, in the Work, is a horizontal Picture, repreſenting a vile Piece of Architecture, and a round Temple (little better) which, by means of a Section (not badly deviſed) taking away one-fourth of the Building, exhibits both an external and internal View. But theſe being amongſt the Notes (although the firſt is a folio Plate, 13 Inches by 8½) I am of opinion have been added, with the Frontiſpiece, by Roſſi. There are ſeveral more Plates of Arches and Arcades, parallel and perpendicular to the Picture, merely Outlines; in one of which, there is an attempt at an Entablature, in the Tuſcan Order, but without Rules for, or Reference to it. Another Plate exhibits a Pedeſtal, geometrically drawn, the Proportions of which, as well as the Mouldings, I can ſay nothing in praiſe of; which (he being an Architect) is ſomewhat extraordinary; the wooden Prints that follow, of the Pedeſtals, the Baſes, and four Columns in Perſpective, are better proportioned; but the Prints of Capitals, compounded of the Ionic and Corinthian, are vile. After theſe are two Plates of double, winding Staircaſes, both geometrically drawn, the laſt is a geometrical Staircaſe; which, with another exhibiting the manner of conſtructing them (to no purpoſe, in Perſpective) concludes the Book.

I had omitted to mention, that, in the firſt Part (in the Notes) are exhibited ſeveral Methods of drawing, mechanically, by Apparatus, all of which, ſave one, are unworthy of notice; which (in a folio Plate) exhibits the horizontal and upright Scale (See Fig. 14. Plate II.). It is a moſt clumſey Conſtruction; the upright Scale is moved, to and again, by means of a Roller, having a Cord fixed, at both ends, to the bottom of the Scale (in the Groove it ſlides in) and, paſſing over a Pulley, at each end of the Groove, is wraped twice round the Roller, which the Perſon turns either way, at diſcretion, with his Hand, and ſo moves the Sliding Scale, to the Right Hand, or Left, at pleaſure. The Diviſions, on theſe Scales, are

by

Plate II. by ſhort bits of ſmall Wire, ſtuck in the edges; which, for the large Diviſions, I approve on and recommend as the beſt, being more obvious than ſmall Lines, as in common Scales; but, being divided ſo, into ſmall Diviſions, they would confuſe the Eye, which could not diſtinguiſh one from the other.

Mr. Kirby is under a miſtake when he ſays, "the Inſtruments which have been publiſhed, of this kind, have no Diſtance limited for the Eye-hole, which make all the Repreſentations that are drawn by an improper Diſtance moſt egregiouſly falſe, as it is demonſtrated in what *we* have ſaid, concerning the Diſtance of the Eye." I know of no limited Diſtance, as the only true; nor is the Perſpective falſe, at any Diſtance; it will be diſtorted, when too little, but not falſe; and ſurely, when it is greater than is either proper or neceſſary, he cannot ſay it is. Of this more hereafter, in the laſt Section.

After expatiating, ſo largely, on the Work of Vignola, to whom (though he was not the Inventor of the Methods of Practice, which it treats on) we are indebted, for handing them down to Poſterity in ſo able a manner, it is ſuperfluous to ſhew how ſome others, before, or cotemporary with him, proceeded in their Operations, in delineating Objects perſpectively. Nor ſhould I think the Authors worthy of notice, but that the ſame Method ſtill prevails, and has, of late Years, been revived, by an Author, not undeſervedly, in repute, in other Subjects. The firſt, we are acquainted with, who practiſed, or publiſhed, this puerile and trifling Method is Jan Vredeman Frieze, a folio Work, in French; printed at the Hague in 1619, which is ſomewhat remarkable, being exactly a Century, before the Art was brought to Perfection, in the moſt ſcientific manner, by, and to the honour of our Countryman, Dr. Brook Taylor.

This Method is by reticulating, perſpectively, the Ground, or Pavement, on which the Objects intended to be delineated, are ſuppoſed to be ſeated; as in the following Example. The dimenſions of the Object being known, or determined on, ſome equal part of it is taken, as a ſcale of Meaſure to work with. Suppoſe it required to draw a Block of ſtone or other materials, which is 3 feet long, 2 feet and a half wide, and 2 feet thick; ſituated two feet and four inches to the right Hand, at one foot diſtance beyond the Picture, having one of its Faces (2 feet, by $2\frac{1}{2}$) parallel thereto, and ſeated on a Face which is 3 feet by two.

Fig. 9. The height, and diſtance of the Picture being determined, make B C (Fig. 9.) equal to the height, and draw the parallel Lines A F and C D; in the laſt of which, make C D equal to the Diſtance. Then, A *a* being taken for the meaſure of a foot, ſet off as many of thoſe Diviſions as are neceſſary, *a*, *b*, &c. from all which draw Lines to C; from A, draw a line to D, cuting them all; and through the Interſections, draw the parallel Lines which complete the Squares. B *d* being equal to the ſituation of the Object to the right hand; in *d* C, a g will repreſent a Side of the Object, and a b another, which is parallel to the Baſe Line. On a, b, and g, draw Perpendiculars, and make a d equal to a *g*, which is 2 feet and a half in that place; draw d C and c C; then draw e f, which completes the Figure; e being the interſection of the Perpendicular g e, by d C. At X is another Object of the ſame Dimenſions, reſting on the Face a d e g, at the diſtance of three feet, from the Picture, and almoſt direct before the Eye; h i being the meaſure of two feet and a half (equal A *i*) in that place.

The next who uſes this Method, that is who has publiſh'd it, was A. Boſſe, a French Engraver of ſome diſtinction; printed in French, at Paris, entitled, *The univerſal Method of Mr. Deſargues Practice of Perſpective, by a ſmall Scale*, and publiſhed in 1647; who had the confidence, or rather effrontry, to aſſert, that it is the ſhorteſt, the eaſieſt, and moſt exact method, not only, that had ever yet been publiſhed, but that ever could be invented. What muſt have been his Confuſion, had he lived to ſee, and to underſtand the true Principles, on which

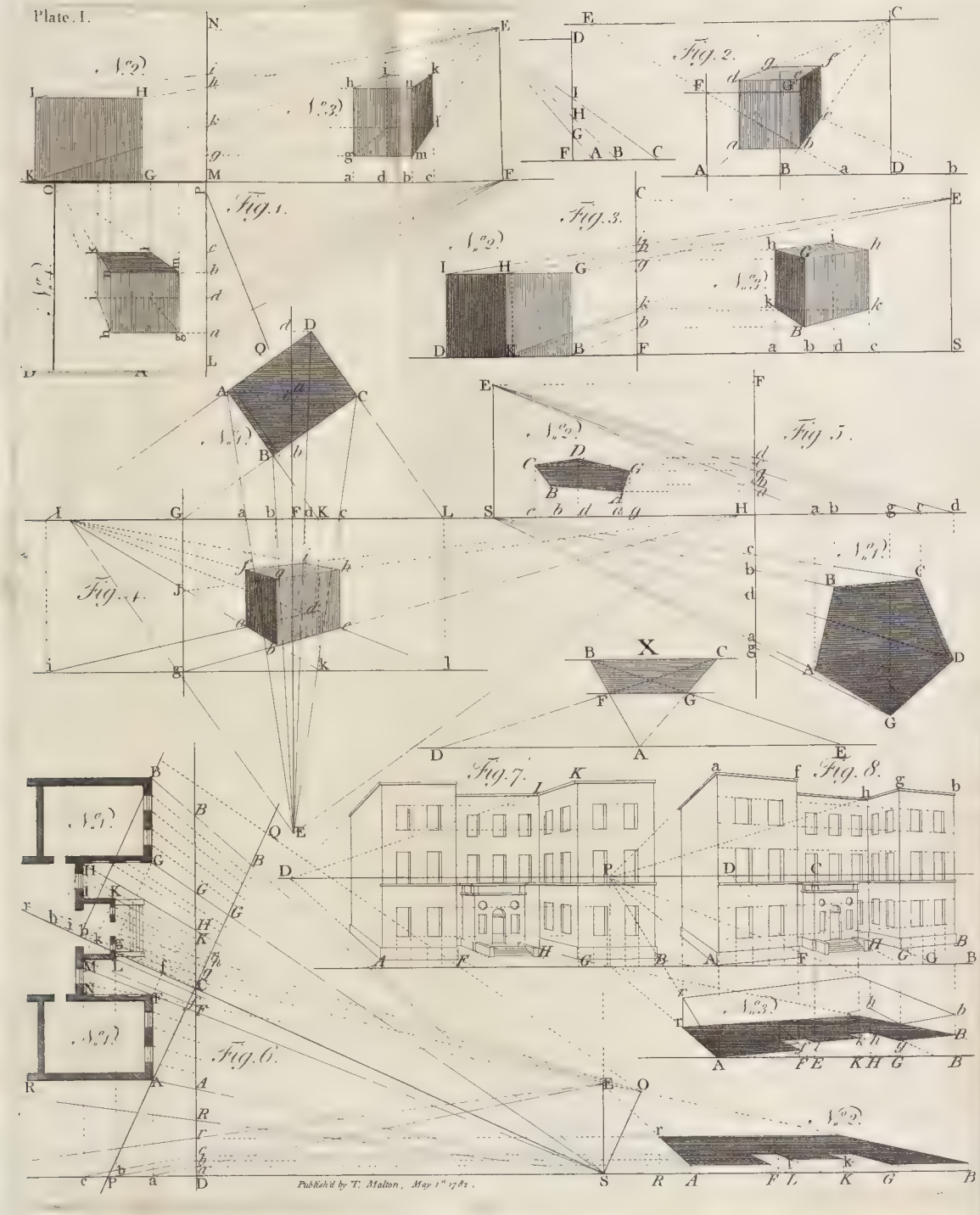


Plate. I.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
Published by T. Malton, May 1st 1781.

the Proceſs is now performed? which, with the utmoſt Confidence, I aſſert, will never be excelled. I ſhall give an Example, of an Object in an oblique poſition:

Let ABCD be the Plan of a Pedeſtal (Fig. 10, No. 1.) ſituated as it is intended to be drawn; i. e. inclined to the Picture in the given Angle ABF. The moſt uſual method was to take a meaſure repreſenting a Foot, with which the Floor was reticulated, at random, without regarding how they cut the Object; but, I would aſk my Friend Boſſe, whether he thinks it is not better to encloſe the given Plan in a Square, as here by EFGH; and divide the Side of the Square into ſuch a number of equal parts, that the Angles, A, B, C, and D, may fall in one of them, or nearly, as here into five; it matters not what their meaſure is, they will be in ſome proportion to the given Side of the Pedeſtal, AB. If the given Figure be not a Square, it may be circumſcribed by ſome Rectangle or other. This Figure may be by any Scale, greater or leſs. Fig. 10.

IK being drawn, for the Ground Line, at the intended height of the Eye draw NL, parallel to IK; in which take O for the Point of Sight; and on IK, take as many Diviſions as you pleaſe, as at f, 1, 2, &c. in proportion to the intended Scale of the Drawing (as at No. 1, to the Plan ABCD) five are ſufficient, from f to g. Having drawn Lines from each to O, he proceeds to gradate them, by a method peculiar to himſelf, at that time; by making, what he calls a perſpective Scale; and which, to do him juſtice, is an uſeful Expedient, often uſed now, though in a very different manner; but not at all neceſſary, when the Diſtance of the Picture does not exceed the limits of the Drawing Board, or Canvas.

KL being drawn, cuting the Baſe Line and Horizontal Line at pleaſure (it is uſually drawn perpendicular, but that is by no means neceſſary) take Kd at diſcretion, and draw dL; then, make LM equal to as many times Kd as the diſtance of the Picture is of the meaſure If, viz. ſix times, and draw KM, cuting dL at *a*; draw *ab* parallel to dK, and draw *b*M, cuting dL at *c*; continue this proceſs as often as there is occaſion, and from all the Interſections, on dL, draw Lines parallel to IK, as *ja*, &c.; by which means, the Squares on the Floor are gradated, as is evident; for if eK be taken the full meaſure of If, and LN be the full Diſtance of the Picture, KN, being drawn, cuts eL at *b*, which, being repeated, will be found to give the ſame diminution of the Squares, as it neceſſarily muſt; for it does not depend on the full meaſure, but on the ratio of one to the other (See Prob. 6. Sect. 4. B. 3) dK is taken, here, half eK, conſequently, LM is half LN. Any other Ratio of If, being taken, will effect the ſame. No. 2.

The Reticulation of the Pavement, being effected, and B, the hither Angle of the Pedeſtal (No. 1.) being ſuppoſed to be in the Baſe Line, at *B*; then it is obvious, that *A* will repreſent A, and *C* the Angle C; f*B* repreſenting three, and f*A* two Diviſions, anſwering to FB and FA, in No. 1; at which Points, *A*, *B*, and *C*, draw the Perpendiculars *AD*, *BE*, and *CF*. Make *BE* equal to the known height of the Cornice from the Floor, in proportion to the Diviſions If, f1, &c. (for the Perpendicular *BE* is in the Picture) and *AD* muſt be made equal to as many of the Diviſions on the Line *Ad*, thus. Take fg equal to the height *BE*, and draw the dotted Line gO, cuting *Ad* at *G*; *AG* will be the true perſpective height of the Angle *D*. By the ſame means *CF* is determined; alſo the height of the Plinth, at *m*, *n*, and *o*; which, being joined by right Lines, complete the Plinth, and the upper Fillet of the Cornice, *D*, *E*, *F*.

The interior Square, or the three Points *a*, *b*, and *c*, which repreſent the Angles a, b, c, No. 1, being determined, and perpendicular Lines being drawn from each, the meaſures thereon muſt be obtained as the other; for inſtance. A Line, parallel to IK, being drawn through *b*, take the meaſures of all the parts, from I or f, on IK, from all which Diviſions draw lines to O, cuting the dotted Line *jb* in the perſpective meaſures of *be*; the other Corners of the Dado, *ad*, and *cf*, being determined after the ſame manner, and joined by right Lines *ik*, *kl*, &c. the ſolid part of the Object is completed.

It is eaſy to conceive how the Faſcia, in the Cornice, and the ſmall Fillets may be obtained, in like manner, from a perſpective Plan of each, on the Pavement;

Plate II. but I am perſuaded, that thoſe Minutias were taken by gueſs, having obtained the principal parts; for it muſt be an endleſs labour to project the whole ſtrictly true. In reſpect of curved Mouldings, as of the Torus, in the Baſe of a Column on the Pedeſtal, at *df*, thoſe Rules could never effect it. Serlio made uſe of the ſame method, of ſquaring, or reticulating the Ground Plane, in order to determine the places and proportions of his Buildings; the openings of Arches, and widths of the Piers, Doors, Windows, &c. were, luckily in thoſe Days, ſo proportioned, alſo Steps, as to be, always, ſome aliquot part, or multiple of each other; nothing could be determined but by Squares, and conſequently, they muſt have had ſome ſtandard meaſure, to which Artificers, of every Denomination, were obliged to adapt the ſeveral Parts of every Building, or other Object, alſo the Spaces between each, with the utmoſt exactneſs, without fractional parts; which are now ſo very common, that ſcarce two parts of any Object, much leſs all the parts of an Object, which is multifarious in its parts, can be reduced to the ſame common meaſure, without Fractions; and, conſequently, cannot be readily delineated, perſpectively, by thoſe means; therefore, this Method is now grown quite obſolete, and others have been contrived, or invented, of meer neceſſity, in compliance with the inaccuracy of the Artificers of theſe later Ages, who have no Idea of proportioning every thing to one, common, ſtandard Meaſure. I ſhall therefore take my leave of Signior Serlio, and Monſ. Boſſe, to ſhew the Method others have purſued, to accompliſh what was ſo readily done heretofore, when Objects were ſo well adapted to theirs.

It may not, I preſume, be thought impertinent, to ſhew how an Object ſo ſituated, as the Pedeſtal, is delineated on the true Principles. The hither Angle of the Object being determined, at *B*, the Ground Line (IK) and the Horizontal Line (NL) being drawn, and the Center of the Picture fixed, at O, OP is drawn perpendicular to NL, and equal to the Diſtance; then, PQ and PL are drawn, reſpectively parallel to AB and BC (No. 1.) i. e. to the Sides of the Pedeſtal, and the Angle LPQ being biſected, or PN drawn parallel to BD (a Diagonal of the Square ABCD) the Vaniſhing Points Q and L, of the Sides, and N of the Diagonal, are determined. By means of the Vaniſhing Points Q and L, it is obvious how exact the Lines *AB*, *BC*, &c. are drawn; and, by the Vaniſhing Point, N, of the Diagonal, the perſpective proportions of the Mouldings are obtained, having ſet up their heights on *BE* (See Ex. 17 and 19. B. 3.) How the Lines are proportioned, it is unneceſſary to ſhew here, at large, frequent Examples are given in the Work; ſuffice it to ſay, that *B*o being taken equal to the known meaſure of a Side, at the Plinth, and QM being made equal to QP, OM, being drawn, cuts *B*Q at *A*, giving *AB* for a Side in perſpective. After the ſame manner *BC* may be obtained; or, drawing *A*L and *B*N, the Angle *D* is determined, and Q*DC* will finiſh the Square *ABCD*; no regard being had to the Squares on the Ground, nor indeed to the Figure at No. 1. its poſition to the Picture, i. e. the Angle ABF, with the true meaſure of a Side being all that is neceſſary. The difference of this Proceſs, being compared with the tedious operation in the other (to ſay nothing of the inaccuracy it is liable to) muſt be obvious to every Reader, who has any pretenſions to knowledge in Perſpective.

In the Year 1642, a Pariſian Jeſuit publiſhed a Quarto Work, in French; which was tranſlated into Engliſh, and publiſhed by Robert Pricke, and thence, by ſome, called Pricke's Perſpective, but more uſually the Jeſuit's, ſometime about the Year 1685 or 6; and, again, by E. Chambers in 1726; a Work which is well known to every Painter and other Artiſt, and is generally eſteemed as the moſt uſeful Work extant, having gone through ſeveral Editions. On account of its ſimplicity, I believe, this Work has furniſhed a greater Number with ſome Ideas of the Subject, than any other; but the Ideas inculcated by it are limited and partial, which has prejudiced all, or the much greater part of thoſe who ſtudied from it; inſomuch that, very few who, having imbibed thoſe Prejudices, can be reconciled to, or prevailed on, to make a fair trial of the method of Practice on the new Principles, and fewer ſtill, who are ever diveſted of their Prejudice, wholly.

This

This Work was the firſt, on the Subject, that happened to fall into my Hands, which I ſtudied with avidity; being, at that time, a perfect Novice in the Art, yet I entered into the Subject very readily; ſo that, before I had gone through half the Book, I had a clear Idea of the whole, which I was by no means ſatisfied with, but wanted conviction of the truth of the Rules preſcribed. In the purſuit of which, I fell, inſenſibly, into the Method uſed by Sirigatti, by means of which, I found, that the determining a Point on the Picture, by the Center and Diſtance (as in the Jeſuit) might be depended on, which evinces my ignorance in Geometry, at the time. However, before I had gone through the whole, I had the courage to attempt drawing the inſide View of St. Martin's Church, which I completed, without other Inſtruction than what I acquired from it. I alſo drew the Portico, on which I beſtowed more pains than on any Drawing ſince, which has been much admired; but, after I became acquainted with Brook Taylor, I found that I knew not what Perſpective meant, before; yet I improved the knowledge I gained from it, by my own ſtudy and application; of which, I preſume, the Work I have produced is ſome proof.

I ſhall, here, take occaſion to ſhew the affinity between the Method of finding the repreſentation of a Point on the Picture, according to the Jeſuit, or to all the modern Writers, and Sirigatti or Vignola; or, how the truth of one is evinced by the other. Knowing how the Point is ſituated, in reſpect of the Picture, and the Eye, its Repreſentation on the Picture is thus determined; e. g.

Let A be a given Point, ſo ſituated to the Picture, that a perpendicular Line being drawn, from A, to the Picture, cuts it at B, its diſtance from the Picture being equal to AB; C is the Center, or Point of Sight. Through C draw EC, at pleaſure, in which take CE equal to the Diſtance the Eye is from the Picture; and, through B, draw BG parallel to EC; having made Ba equal to BA, draw BC, and aE, interſecting at *a*, the repreſentation of A, on the Picture. (See Prob. 6, Sect. 4. B. 3.) Now, EC being conſidered as the Horizontal Line, and BD as the Baſe Line, the Proceſs is the ſame as in all the modern Authors; but they may as well be the Vaniſhing Line and Interſection of any other Plane, which is perpendicular to the Picture; for, if they had been drawn perpendicular, or any how inclined, being parallel, the effect, that is, the Point *a*, will be found the ſame. Fig. Y.

To prove the truth of this Proceſs, by Sirigatti's method, let DS be made equal to the diſtance of the Picture; then is S the Station Point, from which A is ſeen; the Picture may be ſuppoſed to ſtand upright on BD; then, AS, being drawn, cuts it at F; by which it is manifeſt, that the Point A will appear on the Picture, at F; that is, it will appear to be nearer the Station Line, SD, equal FD; which the Perpendicular F*a* evinces, ſeeing it cuts BC in the ſame Point, *a*.

Then, to prove that it will riſe on the Picture equal to Fa, make DG equal to AB, and draw EG, cuting CD (which may be conſidered as a vertical Section of the Picture) at *A*; then it is manifeſt, that D*A* is the apparent height of the Point A, on the Picture; for, the Picture being perpendicular to the Plane in which the point A is ſeated, the Eye being diſtant from it equal EC, and the given Point equal to AB, on the other ſide (equal DG) conſequently, EG is a Viſual Ray, from the Eye, at E, to the Point; and G will appear at A, above the Baſe Line, equal D*A*, i. e. F*a*, which the parallel Line *Aa* evinces.

I am aware that this may not be entirely ſatisfactory, to the ungeometrical Reader; for the Eye is certainly farther diſtant from the point A than EG; wherefore, at S, the point of Station, draw SO perpendicular to SA, and, at F, where it cuts the Picture, draw FI alſo perpendicular; make SO equal to the height of the Eye (equal CD) and draw OA, cuting FI at I. Now, if the Triangle SOA be turned upon SA, till SO is perpendicular to the Ground Plane; then it is plain, that O will be in the true place of the Eye, and the Line FI will be in the Picture; conſequently, the Viſual Ray OA will cut it at I, making FI equal to D*A*, equal F*a*, as before. Or, if CE be made equal

Plate II. to SF, and DG to AF, the dotted Line EG gives the ſame point *A*, as before, and EG, or OA, is a Viſual Ray in its true proportion.

The geometrical Reader will readily perceive (by the ſimilar Triangles, formed by this Conſtruction) that B*a* muſt neceſſarily have that proportion to *a*C, as Ba (equal BA) to EC, i. e. as AB to SD; as BF to FD, i. e. as AF : FS, or AI : IO.

Thus, it was eaſy to prove, without Geometry, that the Method of determining the repreſentation of a Point on the Picture, truely geometrical, is true; and I was, by thoſe means, fully ſatisfied, and convinced of it. The Method uſed by Vignola and Sirigatti is the moſt ſimple and convictive of any, to thoſe who are unacquainted with Geometry, as it muſt be obvious to all who conſider the Proceſs with attention; for it is performed on the moſt ſimple Principles poſſible, and the eaſieſt to be conceived.

I don't find that there is any thing particular in the Jeſuit's method of proceeding, the whole being performed as has been already ſhewn, in reſpect of a Point; for, reſpecting plane Figures, the ſeveral Angles are determined, as above, and joined by right Lines, in general; by which means, he determined the Vaniſhing Points of Lines, inclined to the Picture, that is, to the Baſe Line (for they had no Idea, at that time, of other Vaniſhing Points but in the Horizontal Line) which they called Accidental Points, and they were truely ſo called; for they had no way of determining them, but by finding the two extremes; then, drawing the Line, they produced it to the Horizon, and found its Vaniſhing Point; but, how to cut off any portion of an indefinite inclined Line, they had no other method, than the foregoing, which, in ſome Caſes, is impracticable; when the length of the Line exceeds the bounds of the Picture.

This Work abounds with variety of Examples, but the ſame thing is given over and over, with very little variety in ſituation, which makes it tedious and trifling. The Rudiments are plain and ſimple, ſuch as they are, but it is ſimple, indeed, to a degree of puerility; for inſtance; in order to determine the Horizontal Line, there are no leſs than three Diagrams; in the firſt is the figure of a Man elevated, on Steps; in the ſecond the Figure is ſtanding; and in the third, it is ſiting on the Ground, and, through the Eye, a Line is drawn for the Horizon *; as if it was not ſufficient to be told, that the Horizon, or Horizontal Line, is parallel to the Baſe Line, and diſtant from it, equal to the height of the Eye from the Ground, whether we be ſuppoſed ſiting, ſtanding, or elevated. Then, being told to ſet off the Points of Diſtance, on the Horizontal Line, the whole of the Principles conſiſts in determining the repreſentation of a Point; for, in that only Precept is contained the whole Practice, according to the Jeſuit, and on that Principle every thing is done. Squares it abounds with, and Pavements of Squares; by which means, the places of Objects are determined, as in other antecedent Works. Arches, Arcades, and Groins, often repeated, with Steps and Staircaſes, make up no ſmall part of the Work. In reſpect of Mouldings, he has done ſomething more than others who went before him; but it muſt be obſerved, that almoſt every Object has ſome Face parallel to the Picture; ſome are inclined to it in an Angle of 45 Degrees; ſo that, being right angled, both Faces are equally inclined, which, of all other, is the leaſt pictureſque; the Vaniſhing Points of Lines parallel to the Horizon, are, in this caſe, the Points of Diſtance, which, with the Point of Sight, are the only Vaniſhing Points, in general, uſed. There are ſome trifling attempts at oblique Poſitions, by means of Accidental Points, but to little purpoſe; as the method of proceeding by them, being founded on no geometrical Principle, is tedious, and liable to Error; ſo that, there is not one intereſting or ſtriking Example given.

In ſpeaking of the poſition of Lines, he ſays, ſometimes Objects are ſo ſituated, that the Lines run neither into the Point of Sight nor Diſtance; but, as it were by accident, into ſome other Point in the Horizontal Line; and ſometimes they are

* This Idea, with the very ſame Diagrams, is taken from an old Work, printed at Paris, in French, in the Year 1576, entitled, "Leçons De Perſpective poſitive, par Jacques Androvet, du Ceceau, "Architecte;" of which, the Jeſuit's is ſo cloſe a Copy, that I did not think it neceſſary to conſider it ſeparately, amongſt the old Authors, being ſo little known; yet, a Work of ſome Merit, in thoſe Times.

ſo inconveniently ſituated, that they do not run into any Point in the Horizon, but either above or below it. What trifling puerility is this; as if Objects muſt neceſſarily be ſo ſituated or placed, that the Lines ſhall run into, or tend to certain Points in the Horizon; inſtead of finding means to repreſent them, as they happen to be ſituated, from the determined Station. Herein lies the excellence of Brook Taylor's Principles, which, by pure Geometry, determines the Vaniſhing Points of Lines in Objects, however ſituated; whether they tend to the Point of Sight, or Diſtance, or elſewhere in the Horizon, or, whether they tend above or below it, with equal facility. It is remarkable, that the Jeſuit, and other old Authors, call thoſe Lines on the Picture which repreſent Lines perpendicular to it, and conſequently vaniſh in the Center of the Picture, Viſuals, or Viſual Rays, which they are not, but indefinite Repreſentations of certain Lines; Viſual Rays are Right Lines imagined to be drawn from any Point or Angle in the Object to the Eye, which can only generate a Point on the Picture, not a Line.

In reſpect of Shadows, this Work is, in ſome caſes, extremely erroneous, for he makes no other difference, between Shadows projected by the Sun or a Torch, or Candle; although he tells us that they are parallel when projected by the Sun, yet his Method is the ſame in both; for he determines the Seat of the Luminary on the Ground, is if it was not a hundred Yards diſtant from the Picture; not conſidering that its Diſtance is infinite, to ſenſe, and conſequently, that its Seat is always in the Horizontal Line, whether it be on this ſide or the other ſide of the Picture; nay, when he intends (by the Shadows) that the Sun is on this ſide, yet it appears in the Picture, and its Seat is on the Ground Plane, as if it were between the Picture and the Objects whoſe Shadows are projected; and, when they are projected parallel to the Ground Line, that is, when the Luminary is in the Plane of the Picture, he ſtill determines its Seat on the Ground Plane, oppoſite the Object, and conſequently the Shadows muſt diverge, which ſhould be parallel; alſo, for every Object, the Seat of the Luminary muſt be changed.

In the Year 1647 he publiſhed a ſecond Part, which, in five Sections, treats of the projection of various kinds of Solids; ſuch as Priſms, Pyramids, Stars, Cylinders, Cones, &c. in various Poſitions, but uſually ſtudied for eaſe; ſome are hanging by Cords, ſuſpended, others laid inclined over Blocks, in which there is ingenuity, although the Poſition is calculated for eaſe, as much as may be. Here are alſo the regular Solids, and ſeveral other curious Objects; but there is more to be learned from Inſpection than Deſcription. A third part of this Work was publiſhed in 1649, which is chiefly on horizontal Pictures, and projecting on vaulted Cielings; in which there is nothing ſtriking or intereſting; the horizontal Pictures are numerous, but they are plain and trivial, and moſtly calculated to be ſeen from above, looking down, as if painted on a Floor. The latter part, in three Sections, is wholly on Anamorphoſes and optical Diſtortions, in which there is much Ingenuity diſplayed. Theſe two Parts are bound up together; they are in French, and have not yet been done into Engliſh, and I am of opinion will not ſoon, if ever; for I do not conceive, notwithſtanding the eſtimation the firſt is undeſervedly held in, that it would repay the expence, as it abounds more with the curious than uſeful.

To the firſt Part there is a Theory added, by J. Hodgſon, F. R. S. comprized in nine Theorems; of which, three or four, only, are eſſential. He gives three or four Specimens of Sirigatti's Method; and others, from Maralois, which Pozzo has adopted; but there is nothing in the whole Book, excepting the abſurdity of his Shadows, that can be called original.

Andrea Pozzo, an Italian, of the Society of Jeſuits, publiſhed a Work in Latin and Italian, in two Volumes, folio; the firſt in 1693, the other in 1700, which is conſidered, by many, as the beſt, or moſt valuable Work, of the kind, extant; becauſe it abounds with elegant Deſigns, in pieces of Architecture, ſeveral ſuperb Alters, and magnificent Buildings, finely engraved, at Rome; particularly ſome Cieling Pieces, which are beautiful and grand, and appear to be correctly drawn. The two Volumes differ, not only in the Deſigns, but alſo, in the Method of

Plate II. Drawing, or projecting them perſpectively, like Vignola's two Rules; the laſt, in this Work, being the firſt in the other; ſo that, the Method which Vignola wholly diſapproves, Pozzo prefers.

The 11th Figure exhibits the Method which Pozzo made uſe of, in delineating thoſe elegant Deſigns of Temples and Alters, in his firſt Volume; the whole of which, has been re-engraved in England, by, and much to the Reputation of, John Sturt, who publiſhed the Work, in Latin and Engliſh, in 1707. This Work is in great Eſtimation by many, and indeed deſervedly ſo, in reſpect of the number of fine Plates it contains; there are, in the whole, 105, many of which are really ſtriking Objects; but they are, almoſt, in general, regularly ſituated, centrally, direct before the Eye, and parallel to the Picture; ſo that, one Side is generally a Duplicate of the other, which is by no means pictureſque; but ſtill worſe, being oblique. Indeed it would ſcarce be poſſible, by the Method he makes uſe of, to draw ſuch Objects, obliquely ſituated to the Picture, nor has he attempted it; it would be too complicated and operoſe for human patience, to go through with, as it would require orthographical Projections of both Front and End, in the oblique Poſition firſt; and thoſe to be projected again, perſpectively, in plano, before the ſolid Repreſentation can be effected; which will be better underſtood in an Example.

Fig. 11. At No. 1. is half the Plan of a Pedeſtal, having one Side, AB, parallel to the Picture; the Ground Line of which is DC. No. 2. is the Profile or Elevation of the Pedeſtal, ſeen from E; DF is a vertical Section of the Picture, and EF the Diſtance. A perſpective Plan being drawn, at No. 3. by means of the Diagonal Line CF; which having been ſo often deſcribed, I ſhall omit the Proceſs of it, here, as the dotted Lines, from the Plan, at No. 1. ſufficiently ſhew how it is effected. Any Point, as G, in the Horizontal Line, being taken, and Lines, parallel to the Horizon, being drawn from every Member of the Profile to DF, draw DG; and, from the perſpective Plan, at No. 3. produce all the Lines which are parallel to CD till they cut DG, at D, 2, 3, and 4; from each of which, perpendicular Lines being drawn, and others from all the Interſections on FD (*b*, *c*, *d*, &c.) to G, cuting the Perpendiculars, by their Interſections, the perſpective Profile, at No. 4. is delineated.

Being thus prepared, the Object, at No. 5. is readily deſcribed, thus. From the Angles a, b, c, d, e, and f, in the perſpective Plan (No. 3.) draw Lines perpendicular to CD; and, from the Angles b, c, d, e, &c. of the perſpective Profile (No. 4.) draw Lines parallel to the Horizon, cuting the Perpendiculars from a and b, at *bb*, *ee*; alſo, thoſe at d and e are cut at *c*, *d*, &c. from the correſponding Angles in the perſpective Profile; and by the ſame means, it is obvious, that, all the Fillets in the parallel Mouldings may be determined; and then, from the Angles *b*, *c*, &c. Lines being drawn to E, cuting the Perpendiculars at c and f, in *f*, *g*, &c. the Pedeſtal is completed.

In reſpect of the Mouldings of the Baſe of the Column, on the Pedeſtal, the perſpective Profile is of no further uſe, than to determine how high each Member riſes; for it does not aſſiſt in deſcribing the Curves. The Profile, at No. 2. being drawn, the perſpective Profile is wholly uſeleſs; for, by drawing lines to E, from every Angle of the Profile, *A*, *B*, *C*, &c. their Interſections with FD determine the height of each Member, in the parallel Mouldings, by Vignola's firſt Rule, or by Sirigatti, exactly the ſame; as it is obvious on inſpection. And it is alſo obvious, that the perſpective Profile may be made without the other, by ſeting up the heights of all the Mouldings on DF; the Profile, at No. 2. being of no other uſe here, for that Proceſs, but as a given Deſign, in reſpect of the proportion of the Pedeſtal, with the height and projecture of its Mouldings.

After this laborious manner, are all thoſe fine Deſigns in Pozzo's firſt Volume delineated in Perſpective; having correct Plans and Elevations firſt drawn, geometrical; and then, by making a perſpective Elevation of the whole, in plano; which is not neceſſary if the Vaniſhing Point E be uſed, as it is obſervable in this Pedeſtal; but only the hither Profile of the Mouldings; but, if that be not uſed, then, lines parallel to the Horizon being drawn from each Angle (as g and h of the farther Profile, No. 4.) cut the Perpendiculars at c and f as before, by drawing lines to E, which is more accurate.

I have

I have examined this Work with Attention, and (ſave the Deſigns which are really fine, and well executed) find nothing in it, which can recommend it to thoſe who wiſh to underſtand Perſpective; being well convinced that it cannot be acquired from this Work, not even the delineative part, in the moſt common manner of drawing. Indeed the Publiſher apologizes, in the Preface, for its deficiency, in reſpect of the Inſtruction which might reaſonably be expected from it, nearly in theſe Words. "That no Perſon may be diſcouraged in attempting to learn, from the brevity, or ſilence of the Author; writing in a Country where the Principles, or Elements, of the Art are more generally cultivated and known, there was no need to inſiſt, ſo much, on ſuch matters as are neceſſary to beginers;" &c. True, but the Book may fall into the Hands of ſome, who want to learn the firſt Principles, and Rudiments, neither of which can be had from it; for Theory there is none, and the brevity of the introductory part is ſuch, that very little Inſtruction can be gained. It is ſo very conciſe, that the whole may be read over, and thoroughly digeſted, in a few hours; twelve or fourteen of the firſt Plates, with half a Page to ſome of them, much leſs to others, contain the greateſt part of what tends to inſtruct; many of the fine Deſigns, not having ſix Lines (meerly deſcriptive) without a ſingle Reference; with three, four, or five preparatory Plates, refering to one another, but none for the Operation.

Here are five or ſix Plates tending to the improvement of Scenery, which ſeem as if ſome Inſtruction might be gained from them; but they fall ſhort, like the foregoing, of what is neceſſary for the purpoſe. There is not any attempt at the projection of Shadows, nor the leaſt Inſtructions for giving Effects, by means of reflected Light on Objects; although the Author muſt have underſtood every requiſite thereto, as is obvious from the Plates. One would be led to expect, from the calling of a Jeſuit, ſomething more ſcientific, rather than the fine productions of an Artiſt, in ſuch well executed Deſigns. In ſhort, there would be almoſt as much propriety, in binding together a parcel of perſpective Prints, and calling it a Book of Perſpective. Notwithſtanding the great Expence which muſt have attended the execution of ſuch a Work, and the time ſpent in deviſing and making the Deſigns, in the Original, it is now ſold ſo low as one Guinea, not half its value; yet it is a matter of doubt, if the firſt Impreſſion, of the Engliſh Edition, has been ſold off; for it is reaſonable to ſuppoſe, that, if the firſt Volume had met with encouragement, proportioned to the undertaking, the ſecond would, ere this, have made its appearance, in Engliſh.

Although we are told, in the Title Page, that the method of Practice is entirely new, it had been uſed almoſt a Century before, by S. Marolois; as appears from a folio Work printed at the Hague, in Latin, engraved and publiſhed by Henry Hondius, in 1615, if we may credit Mr. Kirby; but I find it later, viz. in 1633; a Performance which, like many other, abounds more with the curious than uſeful, yet 'tis not void of merit. The Method uſed by Pozzo, in his ſecond Volume, is that which was practiſed by all the old Authors, as in Vignola's firſt Rule, uſually called Sirigatti's; performed by the Line of Interſection, which is an Abridgment of, and greatly preferable to the other, which is obvious; for, lines being drawn to E, from every Angle, *A*, *B*, *C*, &c. of the geometrical Profile, No. 2. cuting DF, the height and proportion of the parallel Mouldings, in the Pedeſtal, are determined, the ſame as by the perſpective Profile, No. 4. and, having the whole Pedeſtal drawn, geometrical, the returning Mouldings may alſo be determined, without uſing E as a Vaniſhing Point, but better with it. Therefore, the perſpective Profile, at No. 4. in which the imagined Excellence of that Method conſiſts, is wholly ſuperfluous; nor ſhould I have dwelt ſo long on it, but that, the Eſtimation the Work is in, ſo very undeſervedly, induced me to enquire thus ſtrictly into its Merits, and to lay them, juſt as they are, candidly before the impartial Public, that they may form ſuch a Judgment of the Work as it really merits.

At the end of Prob. 27. Sect. 5. P. 152. it is referred to the Appendix for another Specimen of the Method uſed by the old Authors for projecting plane Figures, inclined to the Horizon; or plane Solids, reſting on inclined Planes, any how ſituated to the Picture, and compared with the Method on Brook Taylor's Principles.

Let

Plate II. Fig. 12. Let *ABCD* be the Baſe of an irregular Solid, bounded by ſix Planes, which are all Trapezia; no two Faces, or Sides, being parallel, in the whole Solid. The Angle CAI (No. 2.) is the Inclination that Face is ſuppoſed to have to the Horizon. No. 2. is the orthographic Elevation; the upper Face, EFGH, being inclined to the Baſe is ſomewhat ſeen. AE is a vertical Section of the Picture, which cuts the Object, ſo, that the ſolid Angle AFE projects through the Picture, E is the Center and EO its Diſtance; AI is its Interſection with the Ground Plane, and AE the height of the Eye; the Plan of the upper Face is thus determined, the Side DE being in a vertical Plane which is perpendicular to the Picture.

From all the Angles, E, F, G, and H, draw Lines perpendicular to AC, No. 2. as Ee, Ff, &c. make A*e*, on the Section AE, equal to Ae, where a Perpendicular from E cuts AC, and in like manner transfer Af, Ag, and Ah, to A*f*, A*g*, and A*h*. Draw *eE* parallel to *AI*, cuting a Perpendicular from *D* at *E*; and, from *e*, *f*, and *h*, draw Lines alſo parallel to *AI*; then, make *EF* and *EH* equal, reſpectively, to the known meaſure of thoſe Sides, alſo *FG* and *GH**, and join *AF*, *BG*, and *CH*. The Angles *B*, *C*, and *D*, being tranſpoſed to AC, by a reverſe operation, let Perpendiculars be drawn from each, and from all the Angles in the upper Face to AI, as F*F*, G*G*, B*b*, &c. by means of which, and No. 1. the Plan, or Seat of the Solid is formed on the Ground Plane, at No. 3. thus.

No. 3. At any diſtance, at diſcretion, draw eL parallel to *AI*, in which, take a, in a perpendicular from *A*; and, from every Angle in No. 1. draw Lines perpendicular to eL, cuting it at a, e, K, and L. Now, becauſe the Angles A and E, in the Elevation, No. 2. are in the Interſection AE, and eL being conſidered as the Interſection of the Picture with the Ground Plane, a, and e, are the Seats of *A* and *E*. Make af equal to A*F*, No. 2. Lg equal to A*G*, and Kh to A*H*; and, joining the Points ef, fg, &c. the Seat of the upper Face is obtained. In like manner, make ed equal to Ad, Kc to AI, and Lb to Ab, which give the Seat of the Baſe, abcd; then, joining the Angles a and f, b and g, c and h, the Seat is completed.

No. 4. The Seat on the Ground Plane being obtained (No. 3.) the perſpective Seat muſt be next drawn. Let eL, produced, be conſidered as the Baſe Line, and, at the height of the Eye, draw DC for the Horizon; in which, take C for the Center, and CD (equal OE) for the Diſtance of the Picture. Draw C*A* perpendicular, cuting the Baſe Line, and take a Point *A* for the repreſentation of A, as far from that Perpendicular, as a (No. 3.) is from the Perpendicular *A*a. Make *AE* equal to ae; and draw *EC*; and, *Ea* being made equal to de, *a*D is drawn, cuting *EC* in *D*. After the ſame manner, all the other Angles muſt be ſeparately determined; for af, bg, and ch, being inclined to the Baſe Line, do not vaniſh in the Center.

The Angle *F*, being on this Side the Picture is projected, by drawing C*F*, through *A*; and making *A*a equal to af (No. 3.) Da, produced, gives *F*. Then, joining *AB*, *AD*, *EF*, *FG*, &c. the perſpective Plan is completed, as below at No. 4.

Laſtly, the Solid will be obtained, by drawing Perpendiculars from every Angle of the perſpective Plan, and making each equal, perſpectively, to the height of the Angle from its Seat, thus. For the angle *f*; at a (where *F*D cuts the Baſe Line) draw af perpendicular, and equal to F*F*, No. 2. then, draw Df, till it cuts the Perpendicular from *F* at *f*. E*e* is made equal to A*E*, No. 2. becauſe it is in the Picture; and the angle *d*, by ſeting up the height of that Angle (Dd, No. 2.) from *E*, to d, and drawing dC. The other Angles are determined in the ſame manner, by drawing Lines through their Seats, from any Point, D, E, or C, in the Horizontal Line, cuting the Baſe Line, where draw a Perpendicular; as *G*h, equal to the height that Angle is from its geometrical Seat, in No. 2. and, from h, draw a Line to the ſame Point; from b, a Line is drawn to C, which cuts the Perpendicular *Bb* at *b*. The Angles being all obtained, and joined by right Lines, *Ab*, *Af*, *Ad*, *de*, &c. as in the Figure, the Perſpective of the Solid is completed (No. 4.); and after this laborious manner, Objects, ſo ſituated, muſt be drawn in Perſpective, according to the methods of Practice made uſe of in the Jeſuit, and other old Authors, on thoſe limited Principles.

* As the upper Face, EFGH is not parallel to the Baſe, the Lines *FG*, *GH*, &c. are not the full meaſures of thoſe Sides, but are leſs, the more it is inclined; for, the Side will be the Hypothenuſe of a right angled Triangle, of which thoſe Lines are the Baſes; the difference, here, is inconſiderable.

As a Parallel to this Figure, or rather to the manner of projecting it, I refer the Reader, who is desirous to know how it may be projected on the new Principles, to Ex. 1. Sect. 12. Fig. 151. where, a Parallelopiped, whose three dimensions are different from each other, is projected; which would have been somewhat less trouble to project than the last Figure, and that, would be more troublesome on the new Principles; as every Face would require a separate Vanishing Line, and every Line a separate Vanishing Point, seeing that, no two Faces, or Sides are parallel; nevertheless, the facility and accuracy of one, in comparison of the other, is obvious, and performed from the known dimensions of the Figure, and its situation to the Picture, without any previous operation, or geometrical projection, whatever.

Having shewn, by various Methods, how Objects may be projected, perspectively, by Rule, I shall now shew and explain the use and application of an Apparatus, by which, the most complicated or irregular Objects, Landscape Views, &c. may be accurately drawn, without understanding Perspective; the best calculated for the purpose of any I have seen or heard of; at the same time, simple, and easy to be applied. I speak from Experience, having frequently made use of it, in drawing complicated Machines, and other Objects, in which there were scarce any Right Lines, or none that were principal. The Apparatus consists, chiefly, in a rectangular Frame, the length, in proportion to the width, about 3 to 2, is a good shape (See Fig. 13. No. 1.). This Frame is reticulated by silken Threads, or it is better with fine iron Wire, in Squares, not exceeding half an Inch; if smaller, the Drawing may be more accurate. They are usually done with Threads all of one size, or thickness; but I advise larger, or thicker, at every fifth Square, begining from the middle, longitudinally; and, having made one (A B) for the Horizon, in common Cases, set off the other from that, breadthways. Fig. 13.

By means of this Apparatus, I first began to draw from an Object; and the first I attempted was the Portico of St. Martin's Church, of which I made a tolerable Drawing, at that time. The Situation was not the most eligible, being at one End, almost in a Line with the Wall, from a Window in the second Story; so that, the Floor rose on the Picture more than the Cieling appeared to descend; besides, it was too near the Building; the Columns in the Front receded inwardly, and consequently, the Pediment was not seen. Such as it appeared, I drew it; and, as I studied the Shades from the Object before me, it furnished me with general Ideas for shading Mouldings, and other architectural Ornaments; for which, I was seldom at a loss, thereafter. This was not that Drawing of the Portico mentioned before, which was done by Rule (from the Jesuit) for, at that time (though not long before) I knew not that there were Rules for the purpose; or at least, I knew no more than, that certain Lines in the Object tended to what is usually called the Point of Sight; and in that, many imagine they know enough of Perspective, which is knowing nothing to the purpose.

It is a matter of surprize, to me, that 'though almost every Artist knows how, by Reticulation, to reduce or enlarge Drawings from Prints or Pictures, yet are at a loss to apply it in drawing from an Object; in which, there is only this difference, that in the latter, a Sight-hole, to keep the Eye to one Point, is necessary; the application, for Landscape Views, is as follows.

Being provided with a Frame, reticulated as above (No. 1.) in order to fix it, for use, a strong Staff (marked X) not much less than two inches thick, is necessary; for if it be too small, it will not be steady enough, but subject to trembling, when stuck in the Ground; for which purpose, it must be pointed at the Bottom; and, at the other End, a cross piece is fixed (G) about nine inches long, more or less, according to the size of the Frame, for which, a Groove is made, in the upper edge, to fix it upright; it would be better if a Spirit level be fixed in it, to set it horizontal, which the Threads should be, exactly. At G is a hole about an inch and a half wide, and ¾ inch deep, for the Slider, D G, to be fixed in, so that it may be steady, yet free to slide in or out, at discretion, according as the Sight-hole, E, is required to be nearer to or farther from the Frame; which Sight-hole is raised or lowered, as occasion requires, for a higher or lower Horizon, and is fixed by the

Plate II. Fig. 13. turn of a Screw, at D. The Staff may be about 4½ or 5 feet long, ſo that, when fixed in the Ground, the Horizon, in the Frame, may be on a level with the Eye, which is at diſcretion, either ſtanding, or ſiting on a high Stool.

The whole of the Apparatus being fixed, for uſe, at Fig. 13. the Sight-hole being on a level with the Thread *AB* (the Horizon) and diſtant from C, in the Center, about the length of the opening of the Frame, the Landſcape, before it, will appear, on the Threads, from the Sight-hole, as a Drawing reticulated, or ſquared; which may be copied, on Paper, the ſame as a Print or Drawing; but great care muſt be taken, that the Sight-hole be not moved, after you have begun the Drawing, as the places of the Objects, on the Threads, will be varied thereby. Let your Paper be ſquared in the ſame manner as the Frame, but in any proportion you pleaſe; as here, at No. 2. by a larger Scale. Now, ſuppoſe the Frame, at No. 1. with the Landſcape on it, as it appears from the Sight-hole, and, at No. 2. is the Copy of it, on Paper; in which, there is no more difficulty than in copying a Print, as the Lines in the Objects appear to be cut by the Threads, in the ſame manner, as if the Squares were Lines ruled on a Print or Drawing. To deſcribe the operation of Drawing the Copy, at No. 2. would be trifling, as it is evidently the ſame as copying a Picture, or Drawing of any kind.

This method of Drawing ſeems to have originated from common obſervation, of ſeeing Objects through a Window; which, in thoſe early times, when this Inſtrument was contrived and firſt uſed (for it is not of late invention) were not in Squares of two feet in height, but in ſmall Diviſions with Lead, which were almoſt adapted to the purpoſe; inſomuch that, there ſeems nothing left to contrive, except a Sight-hole to fix the Eye; as it was perceivable, that the Objects varied in their apparent proportions to the Squares, on approaching to, or receding from the Window, (being leſs in the former caſe, and encreaſing as we recede) ſo that, it was not poſſible to reduce it to practice without that neceſſary Expedient. The contrivance of a Frame was in order to make it portable; and the dividing it into Squares, by means of Threads, or Wires, can ſcarce be attributed to it as an invention, but an improvement; for, making them leſs ſeems an unavoidable conſequence, which, Experience would ſoon render neceſſary.

No. 3. is a Stand, with Notches in the two upright pieces, at F, F, to fix the reticulated Frame in, when it is to be uſed on a Table, in order to draw any Model, or Machine; the Slider is fixed at G, and then it is ready for uſe as before; the Object being placed before the Frame, which may be fixed lengthways or upright, as the figure of the Object ſhall require.

There is another Method of taking Repreſentations of Objects, from Nature; which is, by having a Plate of Glaſs, well ground and poliſhed, fixed in the Frame, inſtead of Threads; which, being lightly ſmeared over with Gum diluted with water, and when dry, may be drawn on with a ſoft Pencil, or French chalk; by that means, the Objects may be traced on it (the Eye being fixed at the Sight-hole) and afterwards taken off, by tracing the ſame on Paper, oppoſed to a ſtrong Light.

Fig. 14. Fig. 14. is another Apparatus for the ſame purpoſe, conſiſting of a horizontal and an upright Scale; by which, greater accuracy may be uſed, in taking the proportions of the Objects; but, it requires a better hand at Drawing, and is not ſo well calculated for Landſcape as the reticulated Frame; it is thus uſed. The horizontal Scale (W) fixed in the Groove a b, (Fig. 13.) level, may be conſidered as the Baſe Line of the Drawing, divided as a Scale, at diſcretion; having a Groove in the upper edge to receive the upright Scale, which is tongued, at the bottom, to fit the Groove ſo, as to ſlide freely, to and again, yet ſtand firm in any part of it. 'Tis not ſo eaſy to deſcribe the manner of proceeding as by the Frame; but, ſuppoſing the Frame, which appears to be behind the Scale, was brought down, till the edge DE coincides with the upper edge of the Scale, and then, imagine the Frame with the Squares taken away, leaving the Landſcape, only, as if it were the real Proſpect, as it appears through the Sight-hole, which is alſo neceſſary here. The upright Scale being moved, at diſcretion, till it appears, from the Sight-hole, in the direction of ſome Object, or

part

part of the Object; then, noticing the Diviſion in the horizontal Scale, at which it ſtands, and mark the ſame place on the Paper (which is divided in the ſame manner, at the bottom Edge, and one of the Sides) where, draw a Line acroſs the Paper, if neceſſary; and, having marked where any part, or various parts of the Object, cuts the upright Scale, a parallel Line muſt be drawn from the ſame Diviſion on the edge of the Paper, till it cuts the perpendicular Line; and thus, as many Points may be got as are neceſſary to deſcribe the apparent figure of the Object.

There is a ſimple, portable Inſtrument, of a late Invention, for taking the perſpective proportions of Objects, by the very ingenious T. Sandby, Eſq, R. A. called Perſpective Compaſſes; which are well calculated for the purpoſe *. With theſe Compaſſes, the Angle, under which any Object, or the various parts of it are ſeen, is taken, by means of a Sight-hole in the Center, or Joint, the Legs being ſeen through it, pointing to the parts of the Object; alſo, the Bearings of different Objects on one another may be taken, with tolerable accuracy. This Inſtrument is intended only as an Expedient for taking a Sketch, with more truth than by Sight, meerly, on this Principle. Suppoſe the Joint of the Compaſſes to be the Eye of a Spectator, on which the Legs revolve, as the Radii of a Sphere; the Eye being in its Center, which is fixed, whilſt the Points move in its Surface, directs them to the Objects; and conſequently, the meaſures taken, are all in the Surface of a Sphere, which is proper; but then, it is not poſſible to reduce it to a plane Surface, and therefore, the Meaſures ſo taken cannot be applied. Or, granting they could, it is evident, that there would not be any parallelism in the whole Picture; for, whether it be applied to horizontal or perpendicular right Lines, they will neceſſarily be projected into curved Lines, tending to meet each other, and therefore, could not be applied to a regular Building.

To remedy this, the Points are ſo fixed, in the Legs, as to ſlide out, at pleaſure; by which means, Drawings may be made of various proportions; alſo, by the application of a Right Angle (uſually called a Square) the Tangent of the Angle may be taken, but that is attended with much loſs of time. To obviate which, I advise a common Sector to be uſed; then, the meaſure of the Angle being known (by a Quadrant fixed to the Compaſſes) the Tangent of the Angle may be taken, from the Sector, and applied to the Drawing; and thus, the Drawing may be proportioned, perſpectively, to any Scale.

In the application of this Inſtrument, great care muſt be taken, always to apply one of its Points to the ſame Object, or to the ſame part of it, which muſt be fixed on, to be in the Center of the Picture; for, on that, depends the truth of the Proceſs. For, the perſpective meaſure, applied to the Drawing, is not the Chord, but the Tangent of the Angle; and conſequently, muſt be applied from the Point of Contact, which is the Center of the Picture.

* Theſe Compaſſes are made and ſold by Mr. Simons, Mathematical Inſtrument Maker, at the upper end of Mary le bone Street, fronting Glaſhouſe Street, Golden Square.

SECTION II.

Containing Remarks on MILITARY PERSPECTIVE; on BIRD's EYE VIEWS; and on HORIZONTAL PICTURES.

MILITARY Perſpective is a ſpecies of Drawing uſed by thoſe who teach, and who are concerned in Fortifications; which is, of all other, the moſt unnatural and abſurd; for it is neither Perſpective nor, properly, orthographical, as it is preſumed to be, the Eye being ſuppoſed at an infinite Diſtance; that is, properly ſpeaking, at a very great Diſtance; and ſuppoſed to be elevated, above the Ground Plane of the Works, equal to the Diſtance; i. e. ſo, as to ſee the Works, obliquely,

Plate III. Fig. 15. obliquely, in an Angle of 45 Degrees. But, I would aſk thoſe who are Advocates for this kind of Drawing, what end is intended to be anſwered by it? and how they can juſtify the abſurdity of it? Fig. 15. Plate III. exhibits a piece of Fortification, a Ravelin, or Rampart, conſiſting of Breaſt-Works and Parapet, Foſſee, &c. The part, marked W, is a vertical Section, acroſs the Works, at right angles with the direction of the Lines, conſequently it is geometrical; where, then, I would aſk, muſt the Eye be ſituated, to ſee the Lines take the oblique direction, as B C, &c.? Why, it will be anſwered, towards the right hand; but the Diſtance is ſuppoſed infinite, and in that caſe, conſequently all obliquity, laterally, vaniſhes. Whereore, unleſs the Section, at W, was alſo inclined (that is, A B ſhould be ſo inclined, in reſpect of BC, that A B C ſhould indicate a right Angle, which, now appears (as it really is) conſiderably obtuſe) B C cannot appear inclined; therefore, the Repreſentation is abſurd.

The reaſon I have heard alledged, in vindication of this manner of repreſenting the Works, is, that the Drawing exhibits an equal length of the Lines which they really are; but that, I object againſt, and ſhall prove to the contrary. No. 2. exhibits the ſame ſection of the Works (at X) as the other, and the Lines, runing at right angles with it, indicate the length intended, the Eye being elevated, as above; wherefore, ſeeing that the other Lines are inclined to the Section, at No. 1. conſequently, B C, in one, is longer than *B C* in the other; therefore, the intention, in drawing after this manner, is not anſwered, which, if that be the chief object aimed at, is effected at No. 2. and, as every part of the Works is better expreſſed by it (for every part is here ſeen, which is not ſo in the other) I ſhou'd prefer drawing in that manner. Beſides, there is, in the former, a glaring imperfection, which is obviated in the latter; for, although the Figure A D E F is a Parallelogram, yet it does not appear ſo, for D E appears longer than A F, and conſequently, A D and E F do not appear parallel. The reaſon of this is eaſily accounted for; being accuſtomed to ſee Objects, not as they really are, but as they appear, the Eye becomes prejudiced in what it ſees, and a judgement is formed accordingly. It is manifeſt, to demonſtration, that parallel Right Lines, however ſituated, do not appear parallel, although they are, frequently, repreſented parallel; but never when they recede from the Picture, as in this caſe; wherefore, ſince an Object, at a diſtance, appears leſs than the ſame, or an equal Object, being near, and ſince D E is equal to A F, and appears to be at a greater diſtance, it appears longer than A F; and therefore, A D and E F do not appear parallel.

Now, I cannot conceive why Repreſentations of this kind may not as well be drawn truly perſpectively, ſeeing it is as eaſily done, without underſtanding the Rules; and any length of the Lines may be given, at diſcretion, as well as in the foregoing Figures. Fig. 16. A Section of the Works being made, at Y and Z, as in Fig. 16. geometrical as before; then, aſſuming a Point, elevated conſiderably above the Section, as at O, from every Angle of the Section A, B, C, &c. let Lines be drawn to O; and, at whatever diſtance you pleaſe, i. e. at any height above the Section, draw Lines parallel to the correſponding ones in the Section, by which the Drawing is completed.

If any determinate Length be required to be repreſented, it is then neceſſary to fix on ſome diſtance of the Eye; ſuppoſe O P to be the diſtance of the Picture; then, from any angle of the Section, as A, draw A D parallel to O P, and ſet off, from A to D, the length intended, in proportion to the Section, and draw D P, cuting A O at a; then, A a repreſents the length A D, the diſtance of the Picture being O P. At a greater diſtance of the Eye, it is evident, that A a repreſents more length of Line, and at a leſs Diſtance it repreſents leſs; although, A O, in either caſe, repreſents an infinite length. (Theo. 12. Cor. 5.)

I think it muſt be obvious, to every one, which of theſe methods of Repreſentation is the moſt natural and pleaſing to the Eye; and ſince the latter, which is true Perſpective, is as eaſily done as the other, without any knowledge in Perſpective (ſeeing it is but taking the Point O, at pleaſure, and giving any depth of the Drawing, at diſcretion) I ſee no reaſon why it ſhould not be preferred.

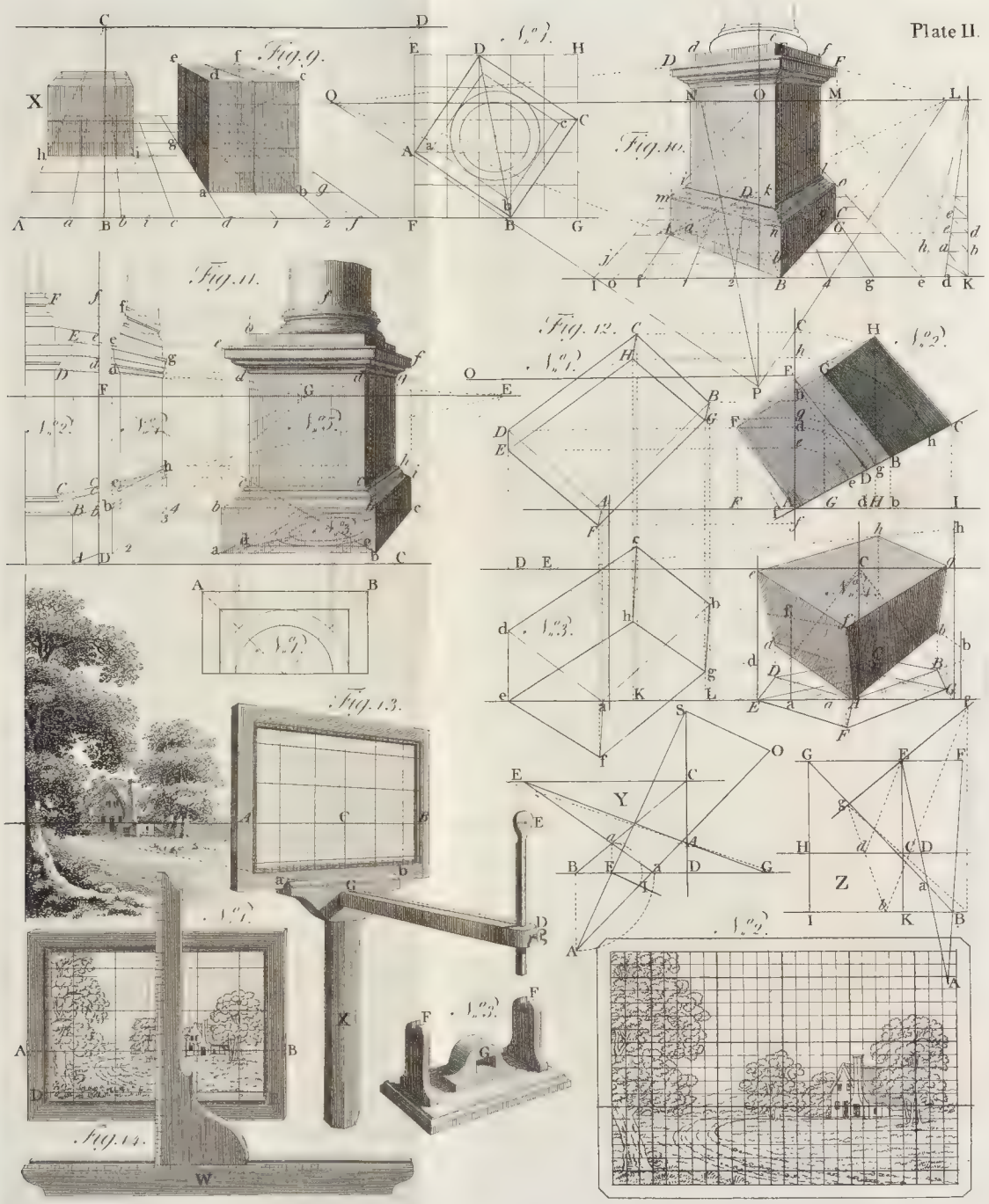


Fig. 9.
Fig. 10.
Fig. 11.
Fig. 12.
Fig. 13.
Fig. 14.
X
Y
Z
W

THIS manner of repreſenting Objects is, by ſome Perſons, conſidered as a diſtinct ſpecies, or different kind of Perſpective, of which there is no variety; for it conſiſts only in taking a greater height for the Eye, in order to ſee thoſe parts of the Object which could not be ſeen with a low Horizon, of the uſual height of the Eye. It is chiefly calculated for general Views of large Piles of Building, in which are large Areas and ſpacious Courts, as in Colleges, Hoſpitals, &c. which are all repreſented at one View, as it is ſeen by a Bird flying towards the Building, at a great height from the Ground; or, ſuppoſing ſome other high Building, or Eminence on which a Perſon might be ſituated, ſo, as to ſee over the hither part of the Building, down to the Ground in the interior Quadrangles; by which means, the Fronts of the interior parts are alſo ſeen, and may be repreſented.

Now, although it rarely happens, that a magnificent Pile of Building is ſo ſituated as to be ſeen, to advantage, from any Elevation which is near; yet it may be repreſented, with as much eaſe and certainty, from an imagined Station, which may be at pleaſure, and which evinces the great uſe and excellence of Perſpective, to every other method of Delineation; for, by no other means is it poſſible to repreſent Objects, with any degree of accuracy, which are not immediately before the Eye; which, without being ſeen, may, by its Rules, be juſtly drawn, and as they really would appear from ſuch imaginary Station, could the Eye be really placed there. In the firſt place, I will ſhew how the Station is determined, from which, as much of the Object may be ſeen as is required.

At Fig. 17. is the Plan of a Building, having two Courts or large Areas, and it is required to ſee the Front of the Buildings in the farther Area down to the Ground; for which a Section is neceſſary, as at No. 2. Now, it is required to ſee down to the Floor at A; therefore, from A draw a Right Line over the Roof of the middle Building, at B, and produce it, at diſcretion. It is manifeſt, that the Eye, being any where in the Line A B, will ſee over the Building, at B, as far down as A; wherefore, ſuppoſe the Eye at E, elevated equal to E F, which is about five times the height of the Building, from which Station the Building is to be drawn, on the Picture at C D; in which it is obſervable, that the height of the Eye is greater than the Diſtance, which, in all common caſes, is conſiderably leſs. Theſe Preliminaries being ſettled, a perſpective Plan, as at No. 3. is drawn, in the ſame manner as any other; drawing O P for the Vertical Line, at pleaſure, the Station being ſomewhat to the right hand; O is the Center, or Point of Sight, O P is the height of the Eye, and the Diſtance is equal to E C; D F is the Ground Line, on which the meaſures are applied, and equal to the width of the Building. Fig. 17.

Fig. 18. is a finiſhed perſpective View, as the Building would appear at the Station S, if it were erected on the Plan, Fig. 17. The Elevation is underſtood from the Section, No. 2; which is ſufficient, for the purpoſe of drawing the perſpective Repreſentation, the figure of the Front being ſuppoſed to be known, which is the ſame as it is here exhibited; for, the Front, being parallel to the Picture, is perfectly geometrical, in this as in all other ſimilar Caſes. From every part of the Section, if Lines are drawn to E, cuting C D (a Section of the Picture) at *B*, *G*, &c. Lines parallel to the Horizon, being drawn from thoſe Interſections, give the heights, on the Picture, of the ſeveral parts of the Building, according to Sirigatti, in the readieſt manner poſſible; which, otherwiſe, muſt be obtained from a Plan, on the Ground, as at No. 3. ſeting off the Diviſions on the Ground Line, at F, G, &c. for the Plan, and on E F for the Elevations, in the ſame manner as in all common caſes, whatever; nor is there any thing particular, or ſingular in it, but in the extraordinary height of the Eye. Fig. 18.

The parallel poſition of the Picture is moſt uſual, and, I think, the beſt adapted for this kind of Repreſentation, as it is by no means eligible as a Picture, but calculated, only, to ſhew the whole of an extenſive Pile, at one View. At Fig. 19. the ſame Building, on a larger Scale, is repreſented, oblique; the Horizon of which is much lower, as it is obvious; otherwiſe, I do not imagine that it would appear ſo pleaſing as the other, but it is certainly more pictureſque as it is. How it is drawn I ſhall not, here, deſcribe, but refer the Reader to the Examples in the third Book, where every neceſſary Inſtruction is given, by which it is effected. Fig. 19.

Plate III. IN the 10th Section of the third Book, P. 226. I have been explicit in the Preliminaries neceſſary for projecting Objects on a Plane parallel to the Horizon; which differs in nothing, but Poſition, from a vertical or upright Picture, in reſpect of the Method of delineating, or in the application of the Rules of Perſpective. I have there obſerved, that the Center of the Picture is the only Vaniſhing Point, in general, neceſſary for horizontal Pictures; for no other reaſon, but becauſe there are but few Objects to be repreſented on them, but what have their Faces, and the Lines in them, either parallel or perpendicular to the Picture. But, amongſt the architectural Ornaments, a Pediment may, with great propriety, be introduced, in which, there are Lines inclined to the Picture; therefore, I ſhall give an Example, here, of a Pediment ſupported by Truſſes, or Conſoles, over the Head of a Nich; which, I preſume, will be acceptable to many; as it contains as much variety as can be neceſſary for Projections of that kind.

Fig. 20. At Fig. 20. No. 1. is a geometrical Elevation of the Front of the Pediment, with a Conſole, of which, X is the Profile; the pitch of the Pediment is a fourth part of its width, which is ſomewhat higher than the common pitch; but is better ſuited to the purpoſe here, both as a covering to the Nich, and alſo, on account of the Repreſentation, which would otherwiſe be very flat. O is the Center of the Picture, for the Repreſentation, and AD is the Ground Line, for the Projection; on which, the meaſures are applied, from No. 1. for the diviſions of the Truſs and Nich. A a, and b D are the widths of the Conſoles, from which, Lines are drawn to O; the perſpective length is determined, as uſual, ſeting off the meaſure from a to g, and drawing gE, OE being the Diſtance the Eye is from the Center, in the Vaniſhing Line of the front of the Nich. The Vaniſhing Points of the raking Mouldings in the Pediment are determined as in all other caſes, of Lines inclined to the Picture (See Prob. 27. Sect. 5. B. 3.) which, here, run out of the Plate; but are eaſily determined, by producing the Lines *FG* and *HG*, till they cut the Vaniſhing Line, EO, produced both ways.

From ſeveral Points, c, d, and e, taken at pleaſure, in the geometrical Conſole, draw lines perpendicular to *CB*; from the ſame Points, and others, at diſcretion, draw lines perpendicular to the former; transfer the meaſures, 1, 2, 3, to a Perpendicular at the point A, from which, draw lines to O; and, having obtained the diviſions, 4, 5, &c. on the Line 3*e*, perſpectively, Perpendiculars from thoſe Points, cuting the Lines from 1 and 2, give *c*, *d*, &c. by which the Curve may be deſcribed, as in the Figure. It is unneceſſary to deſcribe the remaining proceſs of the Conſoles; how, from the points, *c*, *d*, and *e*, the Curves in the other face of the ſame, as well as of the other Conſole are drawn, and completed; ſeeing that, from what has been done, Inſpection of the Figure is ſufficient for the reſt, and more ſatisfactory than a tedious deſcription.

For the Lines *FG*, *GH*, &c. of the Pediment, proceed thus. Take AK equal to the projecture of the Cornice, as at J F, and draw K L perpendicular, and equal to H g, draw LO, cuting a Perpendicular from the Seat of the point *F*, on the face of the Nich, at *F*; or, make L*F* repreſent a length equal to a Perpendicular from F, equal H*C*; now, draw *FH* parallel to AD, and make *FH* repreſent twice FH (No. 1.) then, draw Lines from *F* and *H*, to the two Vaniſhing Points of the Pediments, interſecting at *G*. Or, if a Perpendicular be drawn at *c*, equal to K L, and if *D*O be drawn, then, making *DG* repreſent, perſpectively, a length equal to *C*G, No. 1. *FG*, and *GH* may be drawn without Vaniſhing Points; but, on account of the raking Mouldings, they cannot well be diſpenſed with. The places and projectures of the Mouldings, together with the Corona, c d e (which may be had from a perſpective Profile at Y) ſeeing that they are parallel to the Picture, are readily deſcribed; for, one line in each Member determines the figure, which is ſimilar to its original. Their projectures are obtained, by ſeting off the meaſures, from a, and b, at 1 and 2, and drawing lines to O; as it is obvious in the Figure. A perſpective Profile of the ſection of the Mouldings, at GI, No. 1. may alſo be obtained, as at Z, from which, being transferred to *GI*, the raking Mouldings of the Pediment, by means of their Vaniſhing Points, are completed.

The

The Head of the Nich is described, as any other Circle, having obtained the Diameter, *B C*. Or, taking as many Points, f, g, h, as are supposed necessary, draw the Perpendiculars a f and b g; make B *a* and *a b*, &c. respectively equal to *B* a, a b, &c. No. 1. and from the points *a*, *b*, *c*, *d*, and *e* draw lines to O; and make *a f* and *e k* represent, perspectively, the length of a f; *b g* and *d i*, the length of b g, and make *c h*, represent C h; the Curve described through the points *B*, *f*, *g*, *h*, *i*, *k*, and *C*, will be the representation of a Semicircle, whose Radius is B *c*.

The perspective proportions of a Rectangle, circumscribing the Scrolls, in the faces of the Consoles are easily obtained, in which the spiral Lines may be described by a nice hand; to do it with accuracy, I shall not attempt a description of; much less of the Leaves at the bottom of the Console, such Objects would baffle all Rules; nor do I conceive any other way of effecting it, but by Sections made across in several places, and those described perspectively; and after bestowing a great deal of time in the process, a Person who has judgment in Drawing, from sight, would do it much better; yet, with the help of Rules, it is possible to do them so as not to be offensive to the Eye, and that is all which can be expected.

SECTION III.

Containing Remarks on the ASCENT and DESCENT, from Observations in NATURE; also, on ROUND OBJECTS, in general.

IN this Section I intend, at least I shall endeavour, to place in the clearest point of View possible, that irreconcilable Phænomenon, in Nature, that stumbling Block, which many Persons cannot get well over, usually called a down-hill Representation; that is, to draw, by perspective Rules, or otherwise, the representation of a descending Surface, direct before the Eye; so, as to give, on an upright or vertical Picture, a strong Appearance, or a perfect Idea of Descending, that apparent or real Paradox, which is looked on, by some, as impossible to be effected. What I have already said, on that Head, in the 8th Article, Sect. 6. of the second Book, is sufficient to clear up the Mystery; but other things having since occurred, I presume it may not be impertinent to communicate them, *pro bono publico*.

Being on the Road, some time (perhaps an hour) after Sunset, in October, on a fine serene Evening, a Gentleman in Company imagined that he saw Water, at no great distance; which, for some time, neither I nor my Son (who was present) could perceive. But, the Gentleman persisted in it, saying, that the Water was very much out, indicating a Land-Flood. At length I catched the Idea, and communicated it to my Son, who was struck with the novelty of the Scene; which, indeed, was extremely entertaining. Our Direction, at the time, was towards that quarter where the Sun set, about W. S. W. or somewhat more westerly, though going for London, through Huntingdon or Hertfordshire. The Sky, near the Horizon, was remarkably clear, which exhibited the appearance of Water, at a Distance; with a few darkish Clouds, near, and bordering on the Horizon, being quite still, or apparently without motion; which seemed like small Islands, or Prominences which were not overflowed by the apparent Flood; others seemed like Peninsulas, forming small Bays, and Creeks, to the Imagination; yea so strong was the Deception, when discovered (or rather imagined by me) that it was with difficulty I could divest myself of it, and consider it as I knew it was. The Gentleman, our Companion, saw, and was much pleased with the Deception; which we enjoyed, and entertained ourselves with, while it lasted.

We traveled in a Chaise, and, at that time, on level Ground; but, when we considered the Sky as Water, we seemed as descending, considerably, towards the Water, which appeared perfectly level. This I found, afterwards, easy to account for.

Plate IV. for. Seeing a great breadth of Water, as it appeared (when we were willing to imagine it) before us, it, conſequently, gave the Idea of being ſeen from an Eminence; for, otherwiſe, the open Sea would not give that apparent breadth; ſo that, the Idea of deſcending was neceſſarily connected with it; inſomuch that, it appeared like going down a very ſteep Hill, to our no ſmall ſurprize. I will endeavour to explain the Phænomenon as clear as I can; and doubt not I ſhall do it ſatisfactorily.

Fig. 21. No. 1. Let AB be the ſection of a level Plane, and BD an Aſcent; let AE be a Spectator, and E his Eye; draw EB, and ED to any point in BD. Now, BD being a riſing Ground, conſequently, the ſpace BD ſubtends a larger Angle than the ſame ſpace (BC) on a level; therefore, as much as the angle BED exceeds BEC, BD appears, in breadth, ſo much more than BC, to a Spectator at E. Now, as it is certain, that, Water cannot riſe, but by force, let BD be ſuppoſed level, and AB to deſcend, which is effected by turning the Paper; then, whatever breadth is ſeen, which is ſuppoſed level (for, as far as it could be ſuppoſed to be Water, it muſt appear ſo) as far as the Eye can ſee, ED muſt incline towards it. But, ED does not incline towards BC, or it inclines on the other ſide E; wherefore, if BC was extended infinitely, it could not appear ſo broad as BD, to an Eye at E. Therefore, as a great breadth was ſeen, and AB was really level, either BD muſt riſe, or appear to riſe (which, as it was Sky *, it does appear to do) or AB muſt deſcend. But, BD was ſuppoſed to be Water, conſequently level; and therefore, ſince ſo great a breadth was ſeen, which was ſuppoſed level, AB muſt appear to deſcend, which it really did, in a great degree; otherwiſe, BD being level, the Eye muſt be greatly elevated (equal EF) to ſee ſo great a breadth beyond B.

Hence it is evident, that, whether we are deſcending, as AB, or EB, towards BD (ſuppoſed level) or move on a level, as AB, and BD to aſcend, the appearance of BD is the ſame; ſo that, the Phænomenon of Deſcending (as it appeared to us) whilſt moving on a level Ground, or nearly ſo, is accounted for, by imagining BD, or rather, its Appearance, Bd, to be an extended, level Surface, as Water; in which inſtance, it is manifeſt, how much the ſtrength of imagination may ſuperſede the evidence of Senſe, and particularly, that excited by Viſion.

Hitherto I have ſpoken with regard to Appearances, only, or Deceptions in Nature, in imagining things to be what they are not; I ſhall now ſpeak of the effect which real Objects have on the Eye, and how certain Lines, in one Object, affect others which are contiguous. Being at Exeter, I was ſtruck with the Appearance and Effect of certain horizontal Lines in a Street which deſcended, conſiderably; which, whether I went up or down the Street, the horizontal Lines ſtill appeared to deſcend, the ſame way. I communicated this to an Acquaintance, there, who was much ſurprized at the Appearance, and could not be convinced that the whole of it was a Deception, before he came to the Place; from whence, others had the ſame Appearance. In this Street the Doors of two Houſes joined, or were contiguous, and one Landing-place ſerved both; from which we deſcended by Steps, at one End, the other was on a level with the Street. The firſt Figure, in Plate IV. on the left Hand, repreſents the Aſcent; the right hand Figure is intended to expreſs the Deſcent †; I ſay intended, becauſe it muſt be left for others to determine whether it really does or not, to their Appearance, as it certainly does to mine.

The thing which ſtruck me firſt was the horizontal Lines of the Landing-places, which ſeemed to deſcend, rapidly, towards the Pavement, at the End where they met, as it is obſervable in the Repreſentations given. In order to ſee

* What we call Sky is, in reality, nothing but Air, which fills an immenſe Space; and, being illumined by the Sun, affects the Eye with a beautiful Azure, forming, apparently, a concave Hemiſphere; for, if the Earth was removed, whilſt we remained ſuſpended, at an immenſe diſtance from it, we ſhould appear to be in the Center of a concave Sphere. Wherefore, the Earth, or rather the Water on its Surface, as it appears an extended Plane, cuts it, apparently, into two Hemiſpheres; and conſequently, it appears, at the Horizon, to riſe perpendicularly.

† This Picture is not a Portrait, or an attempt at a repreſentation of the Place, but meerly ideal.

them

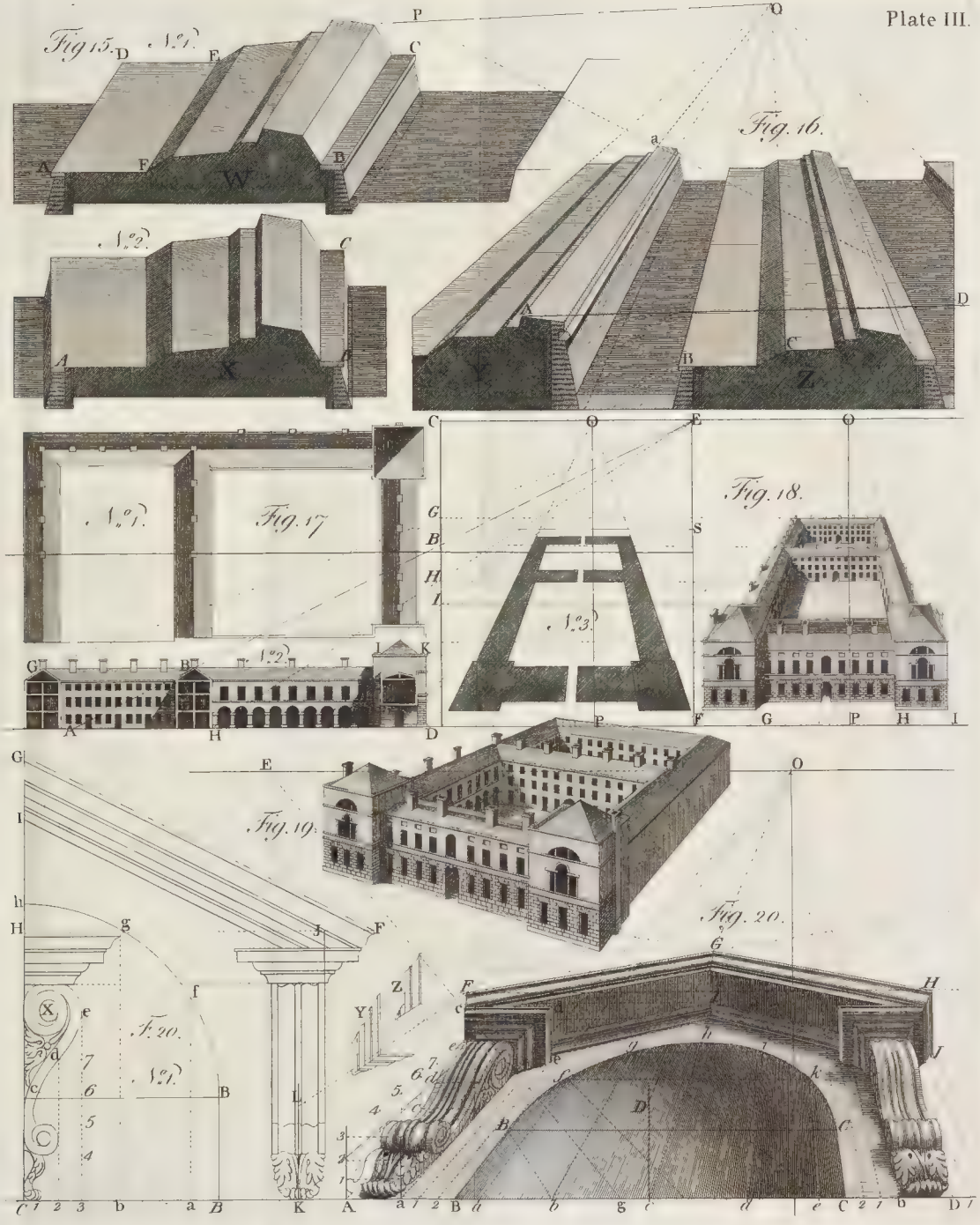


Fig. 15.
N.º 1.
N.º 2.
Fig. 16.
Fig. 17
N.º 1.
N.º 2.
N.º 3.
Fig. 18.
Fig. 19.
Fig. 20.
N.º 1.
N.º 2.

them to advantage, let the Picture be held upright, and the Eye placed perpendicularly over C, for the Aſcent, on the Left, and at E for the other; in the ſame Line, EC, which is the Vertical Line for both Pictures. AC, below the Pavement, is the Horizontal Line for the firſt, and EH, above the tops of the diſtant Houſes, is the Horizon of the other; the Diſtance is about 9½ Inches, 38 Feet to the Scale of the Picture, nearly; or a quarter of an Inch to a Foot; at which Diſtance, the Eye being placed perpendicularly over C, or E, the Deception will be the moſt ſtriking.

The cauſe of this Appearance is obvious; for, whether we go up or down the Street, being more accuſtomed to walk on a level, and ſeeing the Lines a b, &c. make a conſiderable Angle with the Street, they appear to deſcend towards it, the judgment being biaſed, wholly, by the Idea of the Street being level, or much nearer to a level than it really is. For it is not from Sight, ſimply, that we judge of the declivity of the Ground, on which we walk, whether we be aſcending or deſcending; but more, from the difficulty we find in our Aſcent, and being liable to ſlip, or to run, involuntarily, in deſcending; or, ſtanding ſtill, it is from the concurrence of the Lines in Objects which are contiguous, that we determine. But we are apt to attribute great part of the Defect to the Objects, themſelves; and are not eaſily ſatisfied that the apparent imperfection is not in them, or the greater part of it. At Briſtol, I have ſeen Doors, in the Walls of Gardens, &c. which are on a great Declivity, which, it was not eaſy to perſuade myſelf were upright, or nearly perpendicular; owing to the declivity of the Lane, and the Wall raking with it. It is aſtoniſhing with what force ſuch Objects, as we are not much accuſtomed to ſee, ſtrike the Imagination; and how ſtrongly we are prejudiced, in favour of thoſe which are familiar to us. X, X, repreſent two Doors on the inclined Line P*V*, which, it is plain, do not appear, in this Diagram, to be inclined to the Horizon; becauſe we ſee the inclination of the Ground Line P*V*, which is not ſo obvious in the Place, when we ſtand on it, as here; and therefore, we attribute all the Defect where we ſee it is, and conſider the Doors as they are, i. e. upright.

It is very extraordinary, that the ſame Line KL is the Vaniſhing Line both of the Aſcent and Deſcent; and V, the Vaniſhing Point, both of the aſcending Lines, on the left hand, and the deſcending Lines on the Right; ſo that, the ſame ſpace between the Vaniſhing Line KL, and the Ground Line MO, repreſents an aſcending Street, on one ſide ED, and deſcending on the other; which, it is evident cannot be owing to the part which repreſents the Street; for it may, of itſelf, ſimply, taken altogether, equally as well repreſent a level Street, as either; ſo that, it is manifeſt, the Deception does not ariſe from the Ground or Pavement, but from the concurrence of the Lines above it; which from their known poſition reſpecting the Horizon, determine the Inclination of the other. Fig. 21; and 22.

On the left Hand, the aſcending Street ends in a level, at the top, as the regular Buildings above, with a Pediment in the middle, indicate; ſeeing that, the Lines of the Cornice and the Windows, which it is well known are horizontal, tend to the Center of that Picture, at C; yet without conſidering thoſe Circumſtances with attention, it appears to deſcend as much as the other aſcends. Of this appearance, thoſe Perſons who have an opportunity of going over Weſtminſter Bridge may be ſatisfied; for, in aſcending, the middle part, over the center Arch, being horizontal, appears to deſcend in the ſame manner; but not ſo much, becauſe the aſcent is not ſo great. On the right Hand, there are two Deſcents; the firſt, which is the greateſt declivity, goes as far as the fourth diviſion of the Houſes by the Water-Pipe; beyond which, to the diſtance of four more, where is an opening of a Street, the Deſcent is not above half the firſt, for which, I is the Vaniſhing Point; the remainder, to the length of ten Houſes, is a level Street; EH is the horizontal Vaniſhing Line, and E is the Center of that Picture, as C is of the other Side.

The Vaniſhing Lines of the aſcending and deſcending Planes are thus determined. Let the Line R T S repreſent the greateſt Aſcent, and let P R be the height of the Spectator; D Q is the Section of the Picture, and P Q its Diſtance. If P O be drawn parallel to R S, the Picture is cut at *V*, and P Q being perpendicular to the

Plate IV. Picture, consequently, O P Q is the angle of Inclination of the Declivity to the Horizon. Wherefore, as this Diagram is to the Scale of the Drawing as 1 to 2, i. e. half, Q *V* will be half C V; consequently, if the Vanishing Line K L be first drawn, A C, the Horizontal Line, will be distant from it equal twice Q *V*; and P Q is half the Distance the Picture is drawn by. For the Descent, the Diagram is inverted; S is now the Station, and O the Spectator's Eye. From S to T suppose the first Descent, and from T to U the second, in which the Declivity is less; the Picture being at N Q as before, O *V* being parallel to S T gives the Vanishing Line, the same as the Ascent, for that Declivity, whilst O W, parallel to T U, gives T W for the height of the other (equal half D I, as above) and O D, perpendicular to N Q, gives the height of the Horizon; in which D *V* is equal to *V* Q.

Here, the Spectator is supposed to be situated on the greatest Declivity; but, supposing him standing on the horizontal part of the Street, at J, below S, the Vanishing Line would then be nearer to the Intersection, as the dotted Line below O *V* shews. Beyond the second Declivity, at U, the horizontal part begins; but, it must be observed, that, although this Diagram, in respect of the distance of the Picture, and height of the Eye, is to half the Scale of the Drawing, yet T R does not express a third part of the first Declivity, as it is represented, in that proportion.

Something of a similar nature struck me in the Garden at Temple-Ogue near Dublin, where had been a fine Cascade (now in ruin) supplied from a Bason, with a Spring, from a small Eminence. The Water fell from one level to another ten or twelve times, to a considerable length; each Fall was a foot or more, so that, the whole Descent was upwards of twelve feet, which, on each side, was a regular Slope, to the extent of 140 or 50 feet. The Waterfall was bounded by Brick-work, on each Side, in parallel Lines, about 12 or 15 feet wide, with a Border of Stone, on a level, or nearly, with the Ground, which descended regularly with it. The Brick-work was in the same direction, which contributed to the Deception; insomuch that, whether I stood on the upper or lower end, the Water still appeared to descend towards the rising Ground; and it was not, meerly from Sight, easy to be convinced of the contrary. But, it was certain that the Water was level, yet it had all the Appearance of descending; which, as I have observed, the Joints in the Brick-work (being accustomed to see them on a level) greatly contributed to. Fig. 23.

Fig. 23. is intended to represent the Falls of Water, of the Cascade, of which there are eleven; each Sheet of Water representing about 15 Feet square, beyond which is a level, of the same width, about 60 feet in length, which discharges the Water into a Bason of 100 feet, in Diameter (which is not in the Original) as seen from the Eminence, of about 13 feet, at the distance of about twenty-one; the Center of the Picture is at C, for which, the Distance is about 7 inches. The Declivity is equal to the upper Line O W, by which, the Vanishing Point D, of the Descent, is determined, by seting off the Distance on the Horizontal Line, drawn through C; *D* is the Vanishing Point of the Reflections of the inclined Lines, in the Water, determined by making C *D* equal to C D; the rest is obvious, from the Figure.

I cannot answer for the Effect of this on other Eyes, but, to me, it has all the Appearance, necessary to convey a perfect Idea of Water, descending towards the Bason; and, I presume that it will convey the same Idea to others, notwithstanding it rises so much on the Picture, which is accounted for, by the Diagram at No. 1. Let A B be a level, from which B G descends; E is the Eye, and B d a section of the Picture. Now, G B, being produced, passes through the Eye, at E; consequently, it is wholly lost to Sight, as fully, as if it descended twice as much; and either the Eye must be raised, or approach towards it, in order to see it, or the Declivity of B G must be less, as B *G*. Then, a Visual Ray (E *G*) being drawn, to any Point in B *G*, there is formed an Angle with E B; wherefore, since B *G* subtends an Angle (B E *G*) at the Eye, it is evident that the Surface (of which B *G* is supposed a Section) will be seen; and, because the Visual Ray E *G*, is above E B, consequently, it must rise on the Picture, from B towards *g*, which represents *G*, where the Visual Ray, E *G*, cuts the Picture. But, the same length (B C) on a level,

appears to rise more, equal B c, and B D still more; yet it is manifest, that if the Eye be above the Plane, though descending, it must rise on the Picture. E c, being parallel to B G, produces its Vanishing Point, c; wherefore, although B g represents the small, finite part, B G, B c represents it infinitely. It is remarkable, that, notwithstanding there is a strong Appearance of a Descent, from A or B, to D (Fig. 23.) and that each Sheet of Water appears level; yet, in observing how it cuts the Lines of the Brick-work, at each Side, it gives an Idea of descending the contrary Way, towards the bottom of the Picture.

REMARKS on the APPEARANCES of ROUND OBJECTS.

IN the Frontispiece to Mr. Kirby's first production, in Quarto, designed by Mr. Hogarth, amongst many other Absurdities is given a Barrel, in which, both Ends are exhibited to view, even that on which it is supposed to stand; an absurdity so very gross, that one can scarce imagine any Person could be capable of it; yet I have seen both Ends represented on a Sign (at Shrewsbury) the Barrels, or Tuns, being laid along, horizontal. Now, although most Artists would laugh at the egregious absurdity of this, yet are they not a jot the more excusable, who draw the Curves, on any cylindrical Surface, whatever, flater, i. e. less convex, the farther they are removed from that part, where a Plane passing through the Eye cuts it perpendicularly, or from the End which is seen. To the credit of some Artists, and those not the last in reputation, I have observ'd this frequently done; insomuch that, it seems to me, as if it was a general Rule, to represent round Objects in that manner. I have seen Vases represented on Chimney Boards, &c. tolerably neat in the Ornament, and in the Execution, whose upper parts, which are considerably below the Eye, are either convex, in the hither part, or very flat if concave, yet flater downward, and perhaps right lined at the bottom, where the Curves should be most convex; as if they imagined it could not stand on a round Bottom.

Fig. 24. represents a Barrel, according to the usual mode of representation. The Vanishing Line, of the End which is seen, is Q E, and E is the Point of View for it; the Distance is E V, in the Vertical Line, equal E I in the Horizontal; it is described by means of the Square A B C D, on the Side A B, given. In this Figure it is obvious, that the Curves of the Hoops are flater, continually, from the hither end of the Barrel to the other, at *a c b*; the Ellipsis, of which, *a b* is the transverse Axe, or nearly, has its Conjugate (*c d*) much less than the hither end, although, being in parallel Planes, they have the same Vanishing Line, E V; and consequently, that Curve is described by a much greater Distance. *a* I *b* is the true Curve of that End, being seen from the same Point of View, E. Fig. 24.

The 25th Figure exhibits a Bell, as I have frequently seen it represented; in which, the same impropriety in the Curves is remarkable. The Vanishing Line of the Bottom is A B, which passes through the edge of the Table, below; by which the Square, E F G H, is described, in Perspective, in order to ascertain the Curve. The Belts, or Borders, above, it may be observed are flater, the farther they are removed from the Vanishing Line; and the Top appears as if the Eye was elevated equal to it, on a level with it, so that, it appears as if the Bell (being made of soft Materials) was crushed over towards the Eye; for the measure, from the middle of the Curve, at the Crown, to the hither edge of the Bottom, is much less than on the farther side; which would still be less if represented true, owing to the figure of a Bell, spreading so much at the Bottom. The dotted Curves shew the true curviture of the Belts, described on the Diameters I K and J L. Fig. 25.

This manner of representing round Objects is almost general, by which, the Genius of the Artist is discernable. I cannot conceive what they can alledge in excuse for it, being against all Rules, and Reason also, in Objects which are so familiar to us; nay, what is most extraordinary, there are those who can delineate the human Figure, or other Animal, in various Attitudes, with facility, yet will never-

Plate IV. nevertheleſs, be greatly deficient in ſuch regular Objects. Now, thoſe who repreſent ſuch Objects after this manner, yet would ridicule, or treat with contempt, the performance of another Perſon, who, being laviſh of his Genius, had exhibited both Ends of a Barrel, are equally deſerving of ridicule; for, although they have not ſhewn both Ends, yet, I maintain that it is full as abſurd, which I ſhall prove.

Fig. 26. The 26th Figure exhibits a Cylinder; the Vaniſhing Line of the End, A B, is the Vertical Line of the Bell, and the Table below it, which divides them centrally. C D, E F, &c. are intended to repreſent ſeveral Sections of the Cylinder, at equal diſtances, and parallel to the End, or Baſe; conſequently they all repreſent parallel Circles, and have the ſame Vaniſhing Line. Now, if the Curves grow flater as they recede from the Vaniſhing Line, the Section C D, flater than the End, E F than C D, and the next ſtill flater than E F; conſequently, the Section at J L will be a right Line; and what will be the conſequence beyond that? why, it is evident, the Curves muſt take a contrary direction, and then, it is manifeſt, the other End will be ſeen, as at M N, or P Q. But, according to this Delineation, J L is the Vaniſhing Line of all thoſe Circles, from which, as they recede, the Curves are more convex; and, inſtead of a convex Cylinder, it exhibits a concave Surface; if the Light be ſuppoſed on the other ſide it will appear ſo; in which caſe, both Ends may be ſeen, internally; the Ellipſes being all upright, i. e. their tranſverſe Axes are perpendicular to the Axis of the Cylinder, indicates the Point of View, or Center of the Picture, to be at O. Or, ſuppoſing it to be a convex Surface, the Object does not repreſent a ſtreight Cylinder, but one that is bowed, turning both Ends towards the Eye, being oppoſite to the Point O.

Now, what excuſe can be made by thoſe, who, paſſing under the denomination of Artiſts, have ſo little judgment, as to be capable of ſuch improprieties as are unpardonable in a Boy, who has any pretenſions to the Art of Drawing? It cannot avail them to ſay they never made Perſpective their ſtudy; for, although it is the Baſis of the art of Delineation, yet, 'tis not always neceſſary to apply it to every Object that is delineated; for ſurely, if they place any hollow Veſſel, or round Object before them, it is ſoon perceived which way the Curves are turned, and whether the upper or the lower parts are moſt curved. I have ſeen Veſſels of various kinds, ſuch as Punch Bowls, Cups, Tankards, &c. repreſented, by thoſe who arrogate to themſelves no ſmall ſhare of merit, and would highly reſent a Truth being advanced, in Company, reſpecting their Performances, in the delineative part, whoſe Tops were below the Eye, yet the Bottoms repreſented by right Lines or nearly approaching thereto; with various other enormities equally as abſurd; ſome of which are exhibited in the 27th Figure, where almoſt every Object is falſly drawn, either in reſpect of itſelf or of the reſt.

Fig. 27. In the firſt place, the Table on which they are, as it repreſents a Circle, is drawn with a higher Horizon than the things which are upon it; ſo that, a greater breadth being ſeen than is proper, gives it the appearance of being conſiderably inclined, and the things ready to ſlide off. The Plates, reſpecting themſelves, are true; but, the hither Knife and Fork are proportioned to the apparent breadth of the Table, ſo that they are prepoſterous in reſpect of the Plate. The Tankard, on account of the Lid being rounder than the Bottom, appears cruſhed on the hither ſide; the curves in the Lid are lame and imperfect, as is the bottom of the farther Candleſtick; the Punch-Bowl, the Baſon, Decanter, &c. are all more curved at their tops than the bottoms, which render ſome of them very diſagreeable to a judicious Eye. The Shadows are the only Subject that is done with truth; which, being projected by two Candles, is ſomewhat difficult; in ſome parts, the Shadow caſt, by one Candle, is rendered penumbral, or but a half Shade, by the other; and, where the Shadows mix it is uniformly dark; it is indeed a curious Subject, and worthy of notice, and what I do not remember ever to have ſeen done, in a Picture. The Punch-Ladle, where it is cut by the ſurface of the Liquor, is refracted, and takes another Direction; for which, ſee Art. 6. Sect. 5. of the 1ſt Book, P. 36.

The

The Claw-Table (Fig. 28.) with the Things on it, are all described from one Station and Point of View; in the former, almoſt every Object has a different one, and ſome of them more than one Point, the upper Curves being more convex than the Bottoms. The Ellipſis which repreſents the Top is deſcribed on the given Diameter A B; the Center of the Picture is at O (in the Bell) and V is the Vaniſhing Point of the Diagonal of the circumſcribing Square, conſequently, O V is the Diſtance; by means of the point V, all the Curves are deſcribed. Firſt, for the Plate; being ſuppoſed to be as near the Eye as the edge of the Table, and as the Plane of its Rim is above that of the Table, take a b, above the Interſection of the Table (A B) equal to it, and on a b deſcribe the exterior curve, of the Rim; then, as the interior Curve is not in the ſame Plane, but lower, take another Interſection (c d) as much lower; and, c d being its known Diameter, at its proper diſtance, deſcribe the inner Ellipſis, which will be nearer to the outer one, at the hither part, on account of the Rim ſhelving inward. Theſe two Ellipſes are all the delineative part; for, unleſs the Eye was lower, or at a greater diſtance, the bottom cannot be ſeen, or it is loſt in the Shade. The Knife and Fork, are determined, in reſpect of length and breadth, from their place on the Table; the reſt muſt depend on the Hand, and Eye. At X is a Section of the Cup, from which the Curves may all be deſcribed, in its determined place; as the dotted Lines ſhew ſufficiently, from the given Diameters a b, &c. The Ears, or Handles, may, by a troubleſome Proceſs, be deſcribed; but more will depend on a judicious Eye and correct Hand. Fig. 28.

At Z is a Section of the Bowls, from which the meaſures are taken, and the Curves deſcribed. The contour of the external Curve is deſcribed as the Torus of a Column; by deſcribing the Repreſentations of as many Circles as are neceſſary; as of the Diameters at D E and F G. Take *D E*, above the Interſection of the Table, equal to the height of the Bowl, and equal to its Diameter, from which, draw Lines to O, and find the Diameter d e, in its proper place; its diſtance from the edge of the Table is equal to *E a*, and therefore, the diagonal Line of the Table, is likewiſe the Diagonal of the Bowl, by which the Curves are deſcribed. For, the Diameter F G, take another Interſection, equal to its height, at *F G*, and deſcribe the Curve, in its place, of that Diameter, as *f g*; alſo, deſcribe the Curve of the Bottom, at *h i*, and over the extremes of the other, falling into that, or rather below it, at the extremes, the outline Contour is deſcribed. The Curve of the Liquor is the lower Diameter D E, allowing for the thickneſs of the Sides. The other Bowl is of the ſame height, but is larger in Diameter, as much as *b b* exceeds *b* C, its place on the Table being aſcertained, it is deſcribed as the former. The hither Glaſs has its upper Rim in the ſame Plane with the Bowls; its place being determined, by obtaining the ſeat of its Axis, on the Table at s, the height is got the ſame as the Cup; the Curves of the top and bottom being deſcribed, and the height of the Bowl, or Shank, obtained, the reſt is eaſily done by hand, the figure being known.

The Claw-Feet of the Table muſt depend more on the Eye than Rule; but as the Eye is not competent, in ſuch Objects, Rules may aſſiſt, and determine their places, and the juſt proportions of ſome parts; and alſo reſpecting their heights, and projectures from the Center; which being known, and K L being obtained, for the Diameter of a circumſcribing Circle, in its proper place, let the repreſentation of a Circle of that Diameter be deſcribed, of which, O is the repreſentation of its Center, and the ſmall Circle is the Seat of the Pillar on the Floor, If the place of any one of the Feet be determined, as at M, in the Circumference, the other may be determined, by the Vaniſhing Points of the Lines O M, O N, and O P, by Prob. 4. Sect. 3. B. 3.; and if perpendicular Lines are drawn from the two extremes of the ſmall Circle, at the Center, the height of the Claws, and the Mouldings, on the Pillar, may be deſcribed as on a Cylinder, giving ſomewhat more projecture to the curve at the Cup; but, in ſhort, unleſs a Perſon has judgment in drawing what he ſees, the true repreſentation of the Claws can never be effected by Rule; nevertheleſs, Rules may be greatly aſſiſtant thereto.

Plate IV. Fig. 28. In drawing an Object of this kind, by ſight, the judgment is biaſed, conſiderably; for, on account of the height of the Eye, looking down on the Claws, it is remarkable how much the hither one is lengthened, and the farther one, at P, ſtill more contracted; which diſproportion is not perceived in the Object, in any Point of View; wherefore, in aiming to repreſent it, as it appears, we are apt to run into great error, in the Repreſentation; not conſidering that it is referred to an upright Plane, which occaſions the apparent Diſtortion in the parts, reſpecting each other; yet, being repreſented as it appears, the whole Picture would be more unnatural, for the Center of the Picture would be thrown down to the ſmall part of the Pillar, below the Cup; in which part, the Horizon would be very improper, and by no means judiciouſly determined on; and yet, it would be the true poſition of the Picture. In this and in various other Caſes then, it is manifeſt, that the Object is not repreſented as it appears, nor can it be ſo repreſented on a plane Picture; but, all that is or can be done, by the Rules of Perſpective, or by any other means, is, to give ſuch a Repreſentation of the Object, that, the Eye being in the true Point of View, ſhall be affected in the ſame manner as by the Object, and conſequently it will produce the ſame Appearance.

As a Scale of proportion for the Table and the Objects on it, the Diameter of the Bowl (DE) is a Foot, the Diameter of the Table is ſomewhat leſs than three feet, and the projecture of the Claws from the Center (O) about 13 inches; the height of the Eye is ſomewhat more than four feet, Diſtance about three feet four inches.

Fig. 29. The Barrel (Fig. 29.) which is on the Plane of the Table, continued, is truly drawn, by rule, by means of the ſame Vaniſhing Line, but not from the ſame Point of View; although the Vertical Line, for the Table, is the Vaniſhing Line of the Ends of the Barrel, and the Center of that Picture is the Vaniſhing Point of all horizontal Lines which are parallel to the Plane of the Ends; the Center of the Picture for this Barrel is near S in the other. The circumſcribing Squares a b c d and *a b c d*, of the two Ends, ſhew how thoſe Curves are deſcribed; for which, the Line of Interſection is a m, which is above the Plane the Barrel reſts on, on account of the great ſwell in the middle, where the Barrel has a larger Diameter, and which may be thus obtained. Make a e equal to half the difference, between the Diameter of the Ends, and of the middle part, and draw O e; produce the Diagonal c a, cuting O e, produced, in f; draw f b perpendicular, i. e. parallel to a b, and produce d b cuting it; then, draw Lines from f and b to the Vaniſhing Point of the Axis (AB) and make f g equal, perſpectively, to the known diſtance which it expreſſes, of the Hoops; where draw a Perpendicular, which being cut by a Line from b to the Vaniſhing Point, at h, gives g h, in its proper place, for the Diameter of the Hoops in the middle; on which, a Square (g h i k) being deſcribed, perſpectively, the Curve *e f g h*, may be drawn. This Curve, with the contiguous one (*i k l m*) of the ſame Diameter, being obtained, will determine the ſwell of the Barrel; and the Curves of the other Hoops may be deſcribed from them, as in the Figure; to ſay more is unneceſſary.

Fig. 30. Fig. 30. exhibits a Vaſe as it is ſeen ſtanding on the Floor, below the Eye at the natural height, ſtanding, about five feet; No. 1. is a geometrical Profile. A B is the Interſection of the Plane of the Plinth, and a b its width; the Vaniſhing Line of the Horizon is I V, the ſame as for the Table and Barrels; the Center of the Picture, for the Vaſe is at S, near the Center of the extreme end of the Barrel. The diſtance of the Plinth from the Picture is A a; the repreſentation of the Circle, whoſe Diameter found thereon (*a b*) is by means of the Diagonals, from A and B; the Curves of the Moulding above it muſt be deſcribed by means of other Interſections, as in the Plate, on the Table. To deſcribe the large Circle of the Cover, take the Interſection C D, above A B, equal to 1, 3, in the Profile, its height from the Plinth; and, from the Vertical Line (the Axis of the Vaſe) ſet off *e* C, and *e* D, each equal to half the Diameter, as at 3, 4, by which, the Curve *c e d* is deſcribed. Alſo, by means of the Interſection E F, the Curve of the Moulding at 2, 5, is drawn; and

and by the ſame means *gh*, below it, but the Interſection is omitted, to avoid confuſion; and thus, by means of different Interſections, the Curves of the Mouldings around the Vaſe, alſo of the Top, or Cover, may be deſcribed, each in its proper Plane, taking the height and Diameter of each from the Profile; nor is the proceſs ſo very laborious, as may be imagined; at leaſt a few Curves of the principal parts of the Vaſe, five for the Cover, two on the body of the Vaſe, one at the Shank, and two at the bottom, in all ten, by which it may be accurately deſcribed; the reſt, which are contiguous, may be drawn correct enough by hand, directed with judgement, but without that, 'tis in vain to attempt it.

The places and the height of the Handles may be nearly aſcertained; but their figure, and the ornamental part of the Vaſe, muſt be drawn by hand, as it is not poſſible to lay down Rules by which they may be effected.

This Figure has, I preſume, the true appearance of a Vaſe, below the Eye, on the Floor; ſeen at the Diſtance S V, oppoſite the Center S; in which it is obſervable, that the Curves are flateſt at the Top, and grow more convex, the farther they are removed from their Vaniſhing Line; the curve of the Bottom, on the Plinth, is the roundeſt, and yet it ſeems to ſtand firm enough on it. If I had had room on the Plate, I would have given the figure of one, by the very ingenious Mr. Waldron, Drawing Maſter for Ornament, &c. in the Academy of Dublin, which may be ſeen, during the Summer, on a Chimney Board, in Mr. Wilſon's Shop, Bookſeller, on the Pavement, Dame Street; in which, the Curve at the Top, in the greateſt Swell, is not above a third part ſo much bowed as it ſhould be; and below it, the Curve of the ornamental part, in the middle is nearly a right Line, and at the bottom entirely ſo, although the top of the Plinth is ſeen; and the receding Lines in it, which ſhould tend to the Center of the Picture, tend to the Moulding on the Shank, the firſt from the Bottom, and conſequently it is the height of the Eye; and therefore, the Curves at the top would be bowed the contrary way, nor could the whole Circle be ſeen, but only the hither part.

It is, to me, aſtoniſhing, how a Perſon who has any pretenſions to the appellation of an Artiſt, can ſuffer ſuch a Performance to be exhibited to public View, and pretend to teach others; I do not mean to teach Perſpective, but Drawing; for ſurely, he is unfit to handle, or to uſe a Pencil, who has neither Eyes nor Judgment to direct him better; which every one who pretends to draw, from an Object, ought to have. If an Object be placed before us, in the poſition we would wiſh to repreſent it, we can, ſurely, ſee whether the right Lines in it ſeem to tend upward or downward, whether they appear converging or diverging, and towards what part of the Picture they do tend and converge. Or, if the Object be round, it is eaſy to ſee and determine, whether the Curves bow upward or downward, to the right hand or to the left, or whether they grow more or leſs curved; if not, why would a Perſon attempt to draw, at all, ſeeing he has not the firſt neceſſary qualifications of an Artiſt, a judicious Eye, to diſcern, critically, ths tendency or direction of the Lines, and a correct Hand to delineate what he ſees. To be perfect is not human; but, if Rules can be deduced from a Theory which is ſo, is it not incumbent on every Artiſt to make himſelf acquainted with them (if he has a Capacity to learn) before he attempts drawing from Nature, or from an Object? nay, without learning the Rules, to conceive, clearly, the nature and the meaning of Perſpective, in rationale, will inſenſibly correct the Judgment, and render the Eye more competent, to judge of what it ſees, in order to give a proper Repreſentation.

SECTION

SECTION IV.

Of SCENOGRAPHY;

Or the Application of PERSPECTIVE to SCENERY.

IN the application of the Rules of Perſpective to embelliſh the Theatre, there is, indeed, a much larger Field than can, with propriety, be comprehended in an Appendix, even ſuppoſe it contained nothing elſe; for, to treat it fully would make a Volume, of itſelf. I ſhall, however, give an Abſtract of what I have in Idea, which thoſe who underſtand the Rules of Perſpective, thoroughly, may eaſily apply to uſe; and ſome may probably find their account in it, who perhaps will grudge the trifling expence of the Work, to obtain it.

Much has been ſaid, by Mr. Hamilton, reſpecting the declivity of the Stage, the Point of Contraction, &c. to very little purpoſe; ſeeing that, it would be very improper to raiſe the Stage above a certain Pitch; as it would, by inclining it too much, be attended with great inconvenience to the Actors; who, undoubtedly, would prefer a level Floor, to one inclined at all, being more certain of their ſteps. Wherefore, as there is a kind of neceſſity that it ſhould riſe, as it recedes, and, as it muſt abſolutely be fixed, I ſhall leave that Point to the Actors, who are accuſtomed to tread the Stage, they are the moſt competent Judges; not, as it conduces to aſſiſt the Perſpective; but how much declivity is convenient to act on, the Perſpective muſt be adapted accordingly. I am of opinion, to riſe one foot, in ten feet length, would be ſenſibly perceived by the Actors; nevertheleſs, it may be neceſſary, in repreſenting a great length, to riſe more, unleſs the Stage be of ſufficient extent; otherwiſe, the height of the Eye muſt be varied. For, according to the length which can be allowed, in the Theatre, for the Repreſentation of any given length (the height of the Eye being determined) the Floor ought to riſe in proportion. I ſhall ſuppoſe it fixed, to the declivity which one foot, in twelve, gives.

The preſent Conſtruction of the Theatres is ſuch, that 'tis ſcarce practicable to repreſent a real Building, with propriety. For, according to its length, the Point of Contraction, of the whole Perſpective, will be at a greater or leſs Diſtance; and the Side Scenes muſt be ſpaced as the Subject requires; whereas, they are fixed, and cannot be varied at all. How judiciouſly they are fixed, I ſhall enquire; as neither Pozzo nor Hamilton, have given Rules for ſpacing them.

In the Theatres Royal, and in the Opera-Houſe, they are ſpaced equally. According to Pozzo they are nearly equal; in Mr. Hamilton's Schemes they are wider aſſunder, as they recede; in Mr. Kirby's they are equal, ſave the firſt two, which are cloſer together. As his is but an Abſtract from Hamilton (he candidly acknowledging, that "'tis impoſſible for him to treat it better than Mr. Hamilton has done, before him"), I ſhall ſuppoſe that it was intended to be the ſame. Why Mr. Hamilton makes the ſpaces continually wider, I am at a loſs to deviſe, as he does not determine them by any Rule.

On the firſt thought of this matter, it ſeems reaſonable to conclude, that they ſhould repreſent equal Spaces; conſequently, being in Perſpective, they ought to be nearer together, as they recede. Mr. Hamilton tells us, that the firſt Pair repreſent a Space, there laid down; and the reſt, other Spaces, which have no determinate ratio to each other, from any Deſign, or Scale whatever; but are continually larger, conſiderably, ſeeing they are ſtill ſo in Perſpective. In Kirby, they are equally ſpaced; and, according to the Point of contraction of the Stage, which he gives, the fourth Space repreſents, nearly, double the firſt; what reaſon can be aſſigned for this, I cannot deviſe; for it is inconſiſtent and abſurd in the higheſt degree; unleſs certain Spaces had been given, in order to be ſo repreſented.

Much

Plate IV.

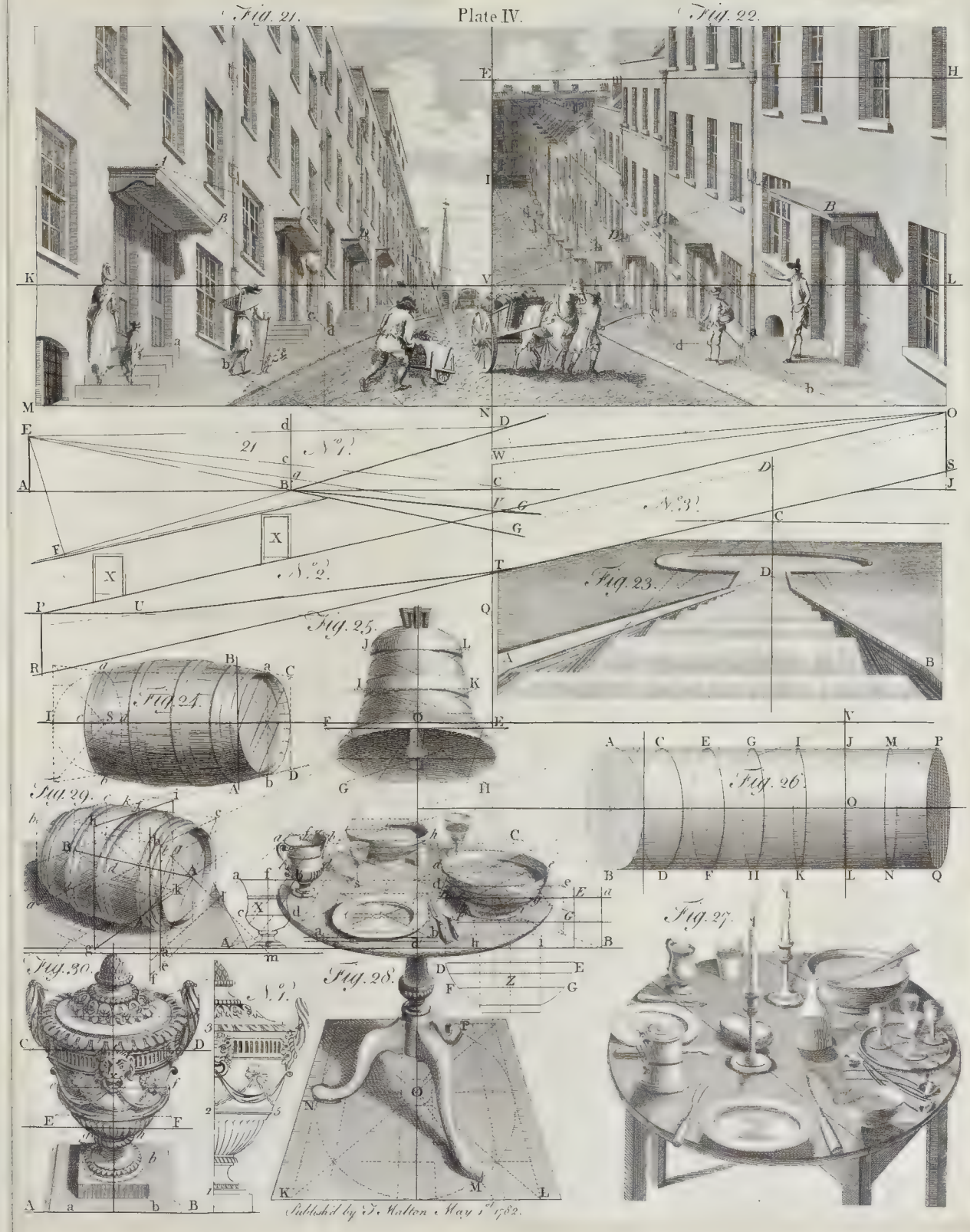


Fig. 21.
Fig. 22.
Fig. 23.
Fig. 24.
Fig. 25.
Fig. 26.
Fig. 27.
Fig. 28.
Fig. 29.
Fig. 30.
N.° 1.
N.° 2.
N.° 3.
Published by J. Walton May 1st 1782.

Can any reaſon be aſſigned, why the ſeveral parts of an elegant Building, internally, ſhould be, in every part, equally ſpaced? or all fall in the ſame line of Direction? as they always do in the Theatres, where one Wing is generally (if not always) a duplicate or likeneſs of another; that is, they are all the ſame, in figure, and frequently in dimenſions, too; which, if they were geometrically ſpaced, on a level Plane, would be right; but, being intended to repreſent a much greater length than the Stage can poſſibly admit of, it is moſt groſsly abſurd to be equal in proportion, as I am well informed they generally are; ſo that, each anſwers for the other, being taken promiſcuouſly; which prevents miſtakes of the Scenes-men, and which, otherwiſe, they would be liable to.

Undoubtedly a Sett of Scenes, which are full of work, with the aſſiſtance of Colours and Gilding (although it is but the ſame thing repeated, one after another, to a conſiderable diſtance) will appear very buſy, and may pleaſe the Eye of an injudicious Spectator; but, where is the propriety of it? as the Inſides of elegant Structures (fit for repreſenting in Theatres) are ſeldom ſo conſtructed; one part being more ſpacious and open than others; the Piers and Columns, variouſly diſpoſed, ſupporting coved or vaulted Roofs, Domes, or other Superſtuctures. To repreſent which, in a proper manner, ſo, as to give each Scene its true place, and proportion, and connecting them ſo together, above, that the Dome or vaulted Roof, horizontal Cielings, &c. ſhall appear to bear on the Columns, or other Supporters; each Pair of Scenes ſo diſpoſed as to appear actually connected with the next, is a real difficulty, a maſter piece in Perſpective, not eaſy to be deſcribed; neither is it worth the attempt, as ſo very few will be benifited by it; yet I ſhall endeavour to do ſomewhat towards it.

There is not one Author, extant, who has treated this Subject (at leaſt, which has fallen in my way) has given a Deſign to be repreſented on the Scenes, which, to me, is unaccountable; that ſo many ſhould attempt a Subject of that importance, without touching on the part, by which, the whole machinery of the Stage muſt be regulated; ſurely, it is as neceſſary here, as for a ſimple, plane Picture, and infinitely more ſo; for, without it, what does all they have done mean, or tend to? in reality, I don't perceive that one of them has done any thing, to any purpoſe*; and therefore, I ſhall do what they have omitted, or had not the requiſites for.

In the firſt place then, it is neceſſary, whether it be a real Building to be repreſented, or a Deſign, exiſting only in Idea, to have a correct Plan and Section of the Building; and to determine, what part of it ſhall be repreſented, on each Wing, &c. The Deſign ſhould be ſo contrived as to have various breaks, particularly at each Column or Pier, which is intended to begin a ſeparate Wing. For, to repreſent, on various detached Planes, a continued Entablature, &c. is not poſſible, ſo, as to appear tolerable out of the true Point of View. Wherefore, in order to be a good Scene-Painter and Deſigner, the Artiſt ought to be a tolerable Architect. Though ſome imagine it very eaſy to arrange Columns and Arches, and vary them at pleaſure, like ringing Changes on a Sett of Bells; true, yet, how few do ſo with propriety, (and produce Harmony) is but too obvious, to a judicious Eye.

The firſt Figure, Plate V. is a longitudinal Section of the Theatre; a i is the Stage, with the determined declivity, and E is the Point of View. AB is the Section of the Curtain, where the Stage uſually begins to aſcend; but, as what is repreſented on it, ſerves only as a Frontiſpiece, or Frame, to what is repreſented beyond it (with which it has no connection) I think it needleſs to begin the aſcent before the firſt Scene (at a) as there will, by that means, be more level Stage for the Actors (called the Proſcene) beyond which, 'tis ſeldom that any thing remarkable is perfomed; ſo that, the remainder of the Stage may aſcend as much as is requiſite for the Perſpective. Fig. 1.

* I except, here, a Work by a French Author, Gabriel, Martin Dumont; printed and publiſhed at Paris, in the Year 1763; which, reſpecting Deſigns for Theatres (ſome of which were erected, abroad, under his immediate Inſpection) appears to be a very valuable and maſterly Performance, and finely engraved. But it may, not improperly, be called Theatrical Architecture; as it reſpects, only, the general, architectural Conſtruction of the Houſe; but in no wiſe regards the Scenery, either in their arrangement, or in what is to be repreſented on them.

Plate V. Fig. 1.

The general Point of View being fixed (at about the Diſtance of the Front Boxes, or ſomewhat forwarder) as at E †, draw EC, horizontal, and produce it till it cuts the Stage (a i) produced to O. It is then manifeſt, as the Stage is intended to repreſent level Ground, that aO repreſents infinity of Diſtance thereon; and conſequently, it is the general Point of Contraction of the whole Scenery.

Now, if iL be the End of the Theatre, and ai the utmoſt length of the Stage, then, according to that length, the whole of a grand Scene (for a Proceſſion, &c.) muſt be adapted; and in doing that, properly, conſiſts the whole Art of Scenery.

Suppoſe then, a*F* to repreſent the whole geometrical length of a Building to be repreſented. Draw E*F* cuting the Stage at f, which repreſents *F* thereon. But, the Theatre will admit of a greater length; ſo that, the Stage need not be ſo much inclined, to repreſent the length a*F*, the Inclination a*f* being ſufficient; in which caſe, the Point of Contraction will be at a greater Diſtance; and conſequently, the whole Repreſentation will be nearer to the geometrical Proportion of the Original.

Hence it is manifeſt, that, according to what length is, or can be allowed, on the Stage, for the repreſentation of any determinate length, the declivity of the Stage ſhould be adapted to it. For, I can by no means allow of much latitude for the Eye, or general Point of View, which, I lay down as an infallible Rule to be on a level with the Eye of the Actors, at a medium, at the hither End of the Stage.

Since then, the aſcent of the Stage is fixed, alſo the Point of View, and Contraction of the Scenes; elſe, by raiſing the Eye, to *E*, the Point *F* will appear at i, at the farther end of the Stage; but ſuch a height for the Eye, would be productive of very diſagreeable Repreſentations, to thoſe below; for which part of the Houſe, the whole ought to be particularly adapted. Wherefore, in order to occupy the whole Stage, either a greater length may be imagined, or the Scale of proportion enlarged, from a*F* to twice a*F*, or more; then, ai is ſuppoſed to repreſent the whole length, geometrical, of what is intended on the Stage. Nevertheleſs, as much length as is required may be repreſented on iL, the flat Scene, which cloſes the View.

Suppoſe a*F* to repreſent, geometrically, as much of the inſide of a Building as is intended to be repreſented, on the detached Side Scenes; and, let *B*, *C*, *D*, &c. repreſent certain Diſtances of Columns, or other Objects, to be repreſented; not neceſſarily at equal Diſtances, but according to their true place in the Building, in reſpect of their diſtances from the Interſection, at a.

Draw E*B*, E*C*, &c. cuting ai, at b, c, &c. which repreſent, in their true places, on the Stage, the Points *B*, *C*, &c. conſequently, a being the place of the firſt Scene, the ſecond will be at b, the third at c, &c. which it is obvious are not equally ſpaced, nor in any regular gradation whatever, but muſt neceſſarily be in thoſe places, and no other; ſeeing it is impoſſible to repreſent, truly, and with propriety, Objects ſtanding on *B*, *C*, &c. ſo, that, all the parts, repreſented thereon, ſhall be properly connected with the other, unleſs the Scenes ſtand in the very places, a, b, &c. as it is evident. For, ſuppoſe any one (as at c) removed, ſo, as to make the ſpaces ab and bc equal, or otherwiſe. Now, the Scene, at *c*, not ſtanding in its true place, in reſpect of the reſt, will be cut by E*C* at the point *c*, above the Stage; conſequently the point *c* is not on the Floor, but above it; and cannot, therefore, appear in a Line with the other Scenes, where they cut the Stage.

† In the middle of the Front Boxes, projecting forward, into the Pit (as at No. 2.) their Majeſties Seat, with an elegant Canopy over it, being fixed, would add, greatly, to the magnificence of the Theatre. At preſent, 'tis in the very worſt part of the Houſe; I grant it is the beſt, for the Audience to ſee their Majeſties; but I think it paying too great a Compliment to the People, to have the worſt place for no other reaſon. In the Front of his Majeſty's Box, a Sight-hole might be fixed occaſionally, of about an Inch in Diameter; which ſhould govern every Piece of Scenery, of any conſequence; and make it (as it certainly ought to be) the principal Situation. The greateſt pleaſure reſulting from theatrical performances, is the Deception; which gives, in a great meaſure, reality to the whole. Then, certainly, the Deception is the leaſt, where the whole Scenery is loſt, or has no Effect; where the Actors are ſeen ready to come on, as they are wanted, to perform their ſeveral parts; the Prompter, the Scene-Shifters, &c. being in ſight, and the nakedneſs of the Houſe expoſed to view; the glare of Lamps full in their Faces (which, alſo, produces a moſt hideous effect on the features of the Actors) all which concur, to render that ſituation the leaſt eligible place in the Houſe.

Hence

Hence appears the neceſſity of having the places of the Side Scenes moveable, at pleaſure, as well as the Flatt, at the far End; all but the firſt, which may be fixed. How far this is practicable I leave to the Managers, or to the Scenes-Men, who are acquainted with the Machinery; I think there would be no great difficulty in it. At the ſame time, it is not neceſſary to ſhift their places for every different Repreſentation; becauſe, for common performances, a proper gradation may be determined on, to which the Deſign might generally be adapted.

Having determined the Diſtance of each Side Scene, from the Curtain, and from each other, their places in reſpect of their ſituation and diſtance, muſt alſo be conſidered, from a Right Line (S P) down the middle of the Stage.

In Theatres, as the whole Place is uniformly regular, on this Side of the Curtain, ſo ought the Scenery to appear on the other; and conſequently, all Grand Scenes, repreſenting a great length, either internal or external, ſhould be ſo regularly diſpoſed, that one Side is a perfect Duplicate of the other. For, as it is in ſome meaſure real, though a Deception on the whole, it would be highly abſurd to take the Station towards either Side (except for very particular reaſons) or, to ſuppoſe the Building inclined to the Curtain; inſomuch that, all attempts at making it more pictureſque, by inclining both Sides of an Object, as in a Picture, are ridiculous. Detached Objects on the large Scene, external, and having no connection with the Side Scenes, may be diſpoſed at diſcretion, as they beſt pleaſe the Eye. In all Grand Scenes, intended for Proceſſions, or Banqueting, &c. on the Stage, they ought to be ſo conſtructed, as to have a ſpacious Area at the hither End, where the Actors aſſemble together; but may be contracted further on, at diſcretion.

The ſecond Figure is the Plan of a Building to be repreſented, internally. A Section muſt be made, and the Building laid open, beyond the firſt Columns (at X, X) elſe, the Stage will be incommoded, in Front. Fig. 2.

From the Section of the Scenes above, produce the Lines which repreſent the Sections of each pair of Wings, through the Stage, indefinite. Draw S A, S B, &c. cuting them, reſpectively, at A, b, c, &c. which give the place of each Column, &c. at the Plinth of the Pedeſtal; and determine alſo the apparent width of each Face, and projectures of the Mouldings.

But, becauſe of the inclination of the Stage, being ſo near a level, and the Eye not being raiſed above the natural height, the Viſual Rays E *B*, &c. cut it ſo very oblique, that the true Interſection is not eaſily determinable. Wherefore, if, from the Eye, a Perpendicular be drawn to S, and from O to P, in the central Line of the Plan; P will be the Point of Contraction, and S the Station Point, by which, the true places of the Scenes may be determined with greater accuracy.

A being the place of the firſt Scene, applied cloſe to the firſt Column, intended to be repreſented, draw A P, which is the general Line of Contraction, of the Scenes, on the Stage. Then, drawing S B, S C, &c. cuting A P, at b, c, &c. the true place of each Scene, reſpectively; but it does not abſolutely limit their extremes on the Stage, as is ſeen by the Figure; which project more or leſs thereon, according as the Objects require. Right Lines, from each Object, to the Station at S, determine the true place and proportion of each, on its proper Scene *.

The true places of the Scenes being thus determined, according to the Original Deſign, there remains nothing more, but to delineate on them (by the Rules ſufficiently deſcribed, and enforced by Examples, in the foregoing Work) whatever belongs to each Scene; taking particular care, not to delineate on the next Scene (as at b) the ſame Column, or Pier, &c. which is already drawn on the Scene A; but, all which falls between that and the other, which is out of ſight from the general Point of View; but muſt, nevertheleſs, be drawn, as a continuation of that Picture, in order to fill up the Space, which would otherwiſe leave a vacancy, to the Spectators on either Side; of which, care muſt be taken, that each Scene is wide enough to cover in, from all the moſt conſpicuous parts of the Houſe.

* This Proceſs, it is obvious, is nothing more than the application of Sirigatti's Method of Delineating, or determining the perſpective proportions of Objects; and which, every Perſon who knows any thing of Direct Viſion, would purſue, without ever having heard of Sirigatti, or his Method.

Plate V. Herein lies the greateſt Art, in delineating on each Scene what properly belongs to it; and to diſpoſe it ſo, as to appear to be connected with the other, in ſome degree, to all the Spectators; though it can be perfectly ſo, only in the general and true Point of View for the whole.

In this particular Inſtance, a deviation from the ſtrict Rules of Perſpective, may be diſpenſed with, diſcretionally; that is, to have more than one Point of View for the ſame Picture, or pair of Side Scenes. For, thoſe parts, which can be ſeen only from either Side, may be ſo delineated, as to appear the moſt agreeable from that Station; but, as another Point can no where be fixed, abſolutely, it muſt depend entirely on the Artiſt's Judgment and Diſcretion.

The Diſtance uſed for delineating each pair of Side Scenes is, reſpectively, E 1, for the firſt pair, E 2, for the ſecond, &c. and the meaſures of the Objects or the ratios of them, are applied to the Interſection, or Ground Line of each, as in all common caſes whatever; each ſingle Scene being conſidered as an oblique front View, of Columns, &c. having one Face parallel to the Picture. Notwithſtanding I have, in the foregoing Work, made many objections to this kind of Projection; yet, in this Caſe, I maintain, that, to give them an inclined poſition to the Picture, is a moſt palpable abſurdity, or to have the Point of View out of the middle.

Fig. 3. Figure 3. is a Section, ſhewing part of the Deſign, of the inſide of the Building, to be repreſented. From the Plan it is obvious, that the left hand ſide, from the Door, is the counterpart of the Right, from A to B, which it was therefore unneceſſary to repeat. On the right hand, the Building is ſuppoſed to be continued; the part from B to D is again repeated, or rather inverted, leaving a Space between (as at C) with Windows, where are Receſſes for ſeparate places of Entertainment, three on each ſide; beyond which a Dome is imagined, ſupported by eight Piers, each compoſed of two Columns with an entire Pilaſter in the Angle (as at X and Z, in the Plan, No. 2.) ſomewhat novel, and I believe unprecedented.

Fig. 4. Fig. 4. repreſents a latitudinal Section through the Plan, on the Line KL, in which, the receding part, with the Door and circular Window over it, above the Cornice, alſo the Nich, and up to the Soffit, under the Architrave, repreſents the far End, ſeen through the middle Avenue, and between the Columns, as at Y (in the Plan) but on the other Side; the Window at W is over the Columns at Y. From X to Z, in the Plan, is one large and ſpacious Area, which is repreſented in the Front of the Stage, begining beyond X; over which is an elliptical Lanthorn, the bottom of which appears in the Sections, at V and U.

The Sections being well underſtood, from the Plan, which repreſents the oppoſite Side, and the places of all the Scenes determined, in the Plan, by Lines drawn from all the parts of the Building, continued, as at B, C, D, E, and F, to S, for which, a Right Line, (CF continued) is ſufficient, ſeting off the meaſures only, which give their repreſentative Places on AP. I is the place of the Flatts*; as there is a large Space, acroſs the Dome, to be repreſented on them, conſequently, a much larger Space is neceſſary, between it and the laſt Scene, at h. As it muſt be obvious, that if the Plan was entire, the other Side being but a Duplicate of this, the poſition of the Scenes on the left hand, will be the ſame as thoſe on the Right, inverted; therefore, it was unneceſſary to repeat them.

Fig. 5. Fig. 5. repreſents the whole Sett, on the ſame ſide, from the middle, according to their geometrical proportions and places, prepared ready for the Painter.

Fig. 6. At the bottom of the Plate (Fig. 6.) is a complete Sett of Scenes, finiſhed, by a larger Scale (as 6 to 5, nearly.) The place of the firſt, to the right hand (No. 1.) is at Aa, Fig. 2. the place of the ſecond (No. 2.) is at b; No. 3. at c; and No. 4. at d, anſwering to the ſame Number in the Elevation, at the top of the Plate; which is the firſt Pair that requires a hanging Scene which unites the two Wings, acroſs the Stage, as one Picture. On it, a part of the Cieling is repreſented, coved at the Sides, and horizontal in the middle; containing about half the Ellipſis, which

* The large ſliding Scenes which croſs the Stage, at the farther End, on which is repreſented all that is not taken in on the Side-Scenes, in order to cloſe the View, are uſually called a Pair of Flatts.

repreſents the Baſe of the Lanthorn; and, being cut out, at the lower edge, e, f, g it will fall in with the next (No. 5.) at *e*, *f*, *g*. This Scene (No. 5.) may be either in two, as a pair of Flatts, or as two Wings, and a hanging Scene, on which is delineated the coved Cieling, all that is above the Cornice; being cut out, whether in two or three pieces, as in the Figure. No. 6. follows next, which will be beſt in two pieces; or it may have a hanging piece, containing the Arch only, falling on the Cornice at both ſides. On account of the View being now contracted, there is no need for much breadth of Cieling to be repreſented; but may be left as in the Figure, unlimited. The 7th Scene being almoſt perfectly ſimilar to the laſt, by a leſs Scale; that is, it muſt have the very ſame Subject repreſented on it, by a greater Diſtance, viz. as E 7 to E 6, Fig. 1. it was therefore unneceſſary to be given; and another reaſon is, that there was no room for it in the Plate. Theſe are the only two which have ſo near a reſemblance of each other; all the reſt differ both in Figure and Proportion; the firſt and the fourth have the ſame Subject, excluſive of the hanging Scene, as is obvious, in the Plan; all the reſt have different Subjects, in great part, in ſome parts the ſame; in ſhort, each has the part allotted to it from the Building. No. 8. has its place at h, and the Flatt (No. 9.) which cloſes the View, is at i; between which, and the laſt Scene, there is a much greater Space than any of the other, to be repreſented on it, equal to the width of the whole Plan; ſomewhat more than half of which, a ſquare Area (over which is a Dome, ſupported on eight ſemicircular Arches) is exhibited on the two, with a Receſs beyond it, to the Door; equal to the ſpace from the front Angle of the Pilaſter to the Wall, in the Section (Fig. 4.) or from the outer Corner, at X, to the Wall, in the Plan (Fig. 2.)

Theſe nine Scenes, with their counter parts, being truly drawn by the ſtrict Rules of Perſpective, and properly ſhaded; the firſt eight having their Profiles cut out, and the parts cut open, of the four next to the Flatts, as in the Plate; and being truly placed, as in Fig. 2. on a larger Scale, proportioned to them, the Stage being inclined, according to Fig. 1. they will exhibit, in the true Point of View, a juſt Appearance of a real Building, according to the Deſign given; in which, every Scene, from the firſt, ſhall truly coincide with the next. The Curve a b, in the ſecond will exactly fall in with *a b* in the third; c d in the third, with *c d* in the fourth; and e f g in that, with *e f g* in the fifth; the reſt do not coincide in any particular part, but the Mouldings, in the Cornices, &c. will all fall into the ſame line of Direction, and the proportion of the parts of each Scene, will ſo harmonize with the reſt, as if the Building itſelf was before the Eye, expoſed to view, internally, erected on the Plan, at No. 2. and ſeen from the Station S, at the height S E *. The Horizon is marked on each, paſſing through the middle of the Baſes of the Columns, and the Center for each Pair, and of the Flat, is alſo marked at C; the Diſtance for each reſpectively is E 1, E 2, E 3, &c. in the Section, Fig. 1. that is, in that proportion, by a Scale adapted to the Scenes, as before-mentioned.

I have obſerved, that what properly belongs to one Scene muſt not be drawn on another. It is obſervable that each Scene muſt neceſſarily begin with a Column, or ſome other Break in the Building, and all the part, which is between that Column and the hither one, may be drawn on it, if neceſſary, to cover in with the Scene ſtanding immediately before it, from the Side Boxes, or ſo much as is thought proper; for, from the hither Boxes it is not poſſible; eſpecially from his Majeſty's Box, on the Stage, from which, the View is almoſt direct on the Edges of the hither Scenes; and conſequently, the beauty and effect of the whole Scenery is deſtroyed, and loſt, to all the Spectators from that part of the Houſe. Hence it is evident, that it is neceſſary to draw more on each Scene than can be ſeen from the true Point of

* The Author, has Models of two Setts of Scenes, one external, the other internal, of the ſame Building. In the interior Scene, there are nine detached Pieces, at different diſtances; ſix of which, beſides the Flatt, are very different in figure, and conſtruction, from each other; yet, ſo calculated as to form one elegant Deſign; each appearing properly connected with the next; forming, altogether, a complete Building, with ſeveral Avenues. The Cieling appears in ſome parts horizontal, in others cylindrical, and coved; a Dome appears in one Place, and Cupola in another; all which appears connected, and properly ſupported from below, with Columns, &c. as they would appear in the real Building, from the determined Station or Point of View.

Plate V. View; for inſtance, the third Scene has the whole Door (at K) repreſented on it, which cannot be ſeen from the Station S, clear of the hither Column; as it is obſervable by applying a Rule to the point S and the edge of the Column, at *a*, the line of the Door is cut at *b*. It is alſo repreſented wider on the Scene than it appears, in the Point of View; becauſe as it can be wholly ſeen, only towards the Sides of the Houſe, it will conſequently appear wider. In which inſtance (as I have before obſerved) a deviation from the true Point of View may be diſpenſed with, in the ſame Picture; as in the Flatt, No. 9. in which, the returning Mouldings, at AB, which are parallel to thoſe at D, in the Original, and ſhould vaniſh at C, tend to another Point in the Horizon, to the left hand; where a Perpendicular from the Eye of a Spectator, on a level with it, and where it can be ſeen, would cut the Plane of the Flatt; and conſquently, from that Station, the Lines in the Original would take a different direction, and the Face AB, with the Arch over it, will appear wider, than from the middle. Therefore, what could not be diſpenſed with, on any account, in a Picture which is wholly taken into the Optic Angle, from the true Point of View, is warrantable, and juſtifiable in this Caſe; becauſe, it cannot be wholly ſeen from any ſingle Point of View, and therefore, may be conſidered as three ſeparate and diſtinct Pictures, though united in one.

On the hanging Scenes it may be obſerved, that there are ſome parts repreſented on two Scenes, which cannot be avoided, with propriety; for inſtance, the Curve a b, in No. 2. coincides with *ab* in the next; and c d in that, with *cd* in the fourth, ſo that, the ſame Border is on both, the hither one hiding the next, in the true Point of View; but, from the Pit, the edge of the hither one will be ſeen more under, and the nearer to the Orcheſtra the more; in which ſituation the farther Scene would appear naked, and deficient, if the Border was not repeated. So, in No. 5. all the part above *e f g*, is alſo repreſented on the fourth; for, otherwiſe, the hither one being removed, as here, or ſeen under, which is nearly the ſame thing, it is obvious that No. 5. would appear very naked without it. How much ought to be drawn on each, ſo as to cover in, from any particular Situation in the Houſe may be determined from the firſt Figure: as for Example.

Let AB be the height of the opening of the Curtain; from the height of the Eye, at E, near the Orcheſtra, draw FB, and produce it to the firſt Scene, cuting it at *a*, which determines the utmoſt height requiſite for that Wing, for, from any other part of the Houſe, *a* cannot be ſeen; from E, the general Point of View, that Wing is ſeen no higher than *b*, the next to *c*, and the third to *d*; from the Pit they will require a greater height. d D repreſents the height of the hanging Scene, No. 4. at e f; then, if from F, a Line be drawn through D, the next Scene is cut at *e*, which ſhews, what height is neceſſary thereon. From E, a Line being drawn through B, paſſes alſo through D to *e*, ſomewhat lower than before, from F. G is the height of the opening of the Arch, in No. 5. from which, a Line being drawn to P, gives the height of the three following, being all equal in the Originals; and if through G, H, and I, Lines are drawn from F, the heights which are neceſſary for painting the next are determined, at *f*, *g*, *h*, and for the Flatt, at *i*; L is the height of the Arch, as it muſt be drawn on the Flatts.

It is almoſt ſuperfluous to ſay more, on this Subject, to ſuch as are at all acquainted with the Conſtruction of a Theatre, and underſtand the Rules given in the Work. To treat fully on it, and go through the whole Proceſs of one Set of Scenes, would far exceed the bounds preſcribed for this Appendix; which has other Matters yet to treat of. If what is ſaid be clearly underſtood, there needs no more; as each Perſon's own Judgment, with proper application, will ſooneſt make him a Proficient, and enable him to improve on the hints I have given.

In reſpect of the poſition of the Side-Scenes, it is uſeleſs to expatiate; for, to ſuppoſe them in any other poſition, than parallel to the Curtain, is a groſs abſurdity, and can anſwer no uſeful purpoſe, whatever. I cannot conceive what ſhould induce the Italians (according to Pozzo) to prefer the inclined Poſition; as he ſeems to be very little acquainted with the delineation of Objects inclined to the Picture; in this Caſe, they are two inclined Pictures, in the place of one, parallel; which can never

never appear tolerable, but in the true Point of View; in ſome parts of the Houſe, moſt intolerable. Beſides, in interior Views, where there is a neceſſity for hanging Scenes to unite each pair, as one Picture, on which, the Roof or Cieling is repreſented, it would be the moſt abſurd thing imaginable; which every one, of judgment, muſt acquieſce in.

Yet, in ſome Circumſtances, inclined Scenes may be uſed to great advantage, viz. in repreſenting a long Street, of Houſes in Right Lines, which can never be done, properly, in the common way, on ſeveral parallel pieces *. But to draw the Objects, properly, on inclined Scenes, there are but very few who are duly qualified.

The Method of drawing Scenes by Reticulation is puerile and tedious, and liable to great Error; which is done, by drawing a true Perſpective of the whole, on an entire Picture, in the place of the firſt Side-Scenes; then reticulating the whole Picture, the Squares are projected to the ſeveral detached Scenes. Mr. Kirby imagines that he has done ſomething extraordinary, in attempting a Method, whilſt himſelf knew not how to apply it to practice.

It is manifeſt, that as they diverge, they are continually encreaſing; from which it is evident, that, in order to appear equal to the repreſentation on the entire Picture (being beyond it) the parts muſt neceſſarily be larger, as they recede farther back. But, to be at the trouble firſt to delineate one entire Scene, and to reticulate the others from it, will be attended with great loſs of time unneceſſarily. Beſides, they muſt not be reticulated as Mr. Kirby has done them, leſs and leſs as they recede, but larger and larger; elſe, how is poſſible that they can appear equal to the ſame Repreſentation on the entire Picture.

Mr. Kirby ſeems to imagine, like others, that each Wing is to be a duplicate of the other, on a ſmaller Scale, as they recede, by ſquaring them all alike, which is not the Caſe; for, they ought to be ſo reticulated as to appear, in the Point of View, as an entire Picture; conſequently, each part on the entire Picture, muſt be projected forward to the detached Scenes, and fill the correſponding Squares on them. But, as the Profiles cannot poſſibly be cut out before they are drawn, ſome parts will fall on the hither Scene, which ſhould be projected to the next.

Having done the whole by this Method they will be greatly defective, and only fit to be ſeen, from the true Point of View; as there will require additional parts to each Side Scene, except the firſt pair; alſo on the Flatts, which could not be repreſented, on the entire Picture; which, if the Artiſt be not well acquainted with Perſpective, he will find difficulty in filling up, properly.

In reality, it is a bungling and very imperfect method of proceeding, fit only for ſuch as know but little of Perſpective; who imagine, from a Print, or Drawing in Perſpective, they can form a Sett of Scenes. But I am afraid they will find themſelves miſtaken, if they are not acquainted with its Rules, for to do it, with ſucceſs, requires both judgment, and knowledge in Perſpective. 'Tis a very different Caſe, to that of copying Prints or Drawings entire, by a larger or ſmaller Scale (except what belongs to a pair of Flatts, only, which is the ſame thing, in every reſpect) I mean, from one entire Drawing of the whole, to perfect a compleat Sett of Scenes; as thoſe who have tried it muſt have experienced.

To form a Sett of Landſcape Scenes, requires little knowledge in Perſpective. The ſeveral parts, as Trees, Hills, Rivers, &c. are not delineated by its Rules, but by the Judgment of the Artiſt; and although a Building be here and there introduced, yet, they are generally ſuch as require but little knowledge of Lines; except the View be a Garden, or other Ground Plot, regularly laid out, with Buildings, &c. interſperſed, ſome of which are principal Objects.

* Thoſe who chooſe to be convinced of the truth of this aſſertion, may have ocular conviction; as I have a Model, by me, of a Sett of Scenes, repreſenting a local View, on an entire new Plan; which every one, who has ſeen it, affirms to be the moſt juſt and natural Repreſentation, of a real Place, they have ever ſeen repreſented; in which, every Perſon (whoſe Habitation is on the Place) ſhall know his own Houſe, in any part of the Theatre; a thing never yet done on the Stage. One or two principal Objects, to characterize the Place, being thought ſufficient; the reſt, if natural in any Point of View, is all confuſion and abſurdity in every other, particularly towards the Sides of the Theatre; whereas, this appears real every where, or as much ſo as can be, on plane Surfaces.

Yet ſuch is the miſtaken notion of the Managers, that it is a queſtion if they ever looked further into the Merits of a Scene Painter, than, that he was a good Landſcape Painter; which was the firſt, and perhaps the only recommendation; whereas, a thorough knowledge of Lines, in Geometry and Perſpective, is the chief, and abſolutely neceſſary qualification. In ſhort, he ſhould underſtand the whole Conſtruction of the Scenes and Theatre. Painters of Landſcape may always be found to execute what is requiſite in that Walk; when, perhaps, a Century does not produce five Perſons, ſufficiently qualified for the direction and management of the Scenery, in general.

SECTION V.

Of the Application of PERSPECTIVE to a SHIP.

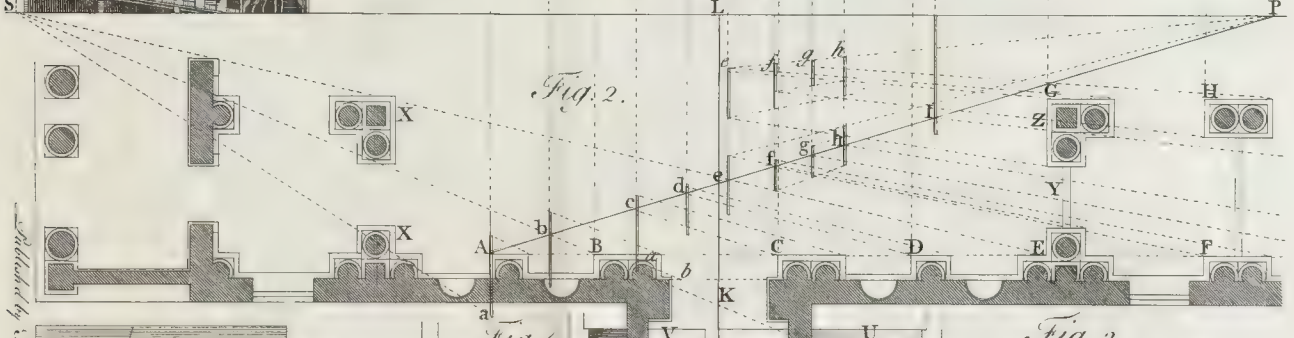
SOMETIME about twenty Years ago, I remember to have ſeen a Work, which was publiſhed about that time, called Naval Perſpective; which implies nothing more than the application of the Rules of Perſpective to the delineation of a Ship; than which, there is not a more beautiful Object; and, being properly delineated, is a moſt pleaſing Figure, which, I am of opinion, very few take the pains to delineate by Rule; indeed but few are capable of it, who make Ship-painting their more immediate Study. I am ſorry that I cannot ſpeak of that Work, reſpecting its Merit or Deficiency; for, with all my aſſiduity, I have not been able to meet with or hear of it; and I cannot, from memory, ſay any thing concerning it, nor can I learn who was the Author.

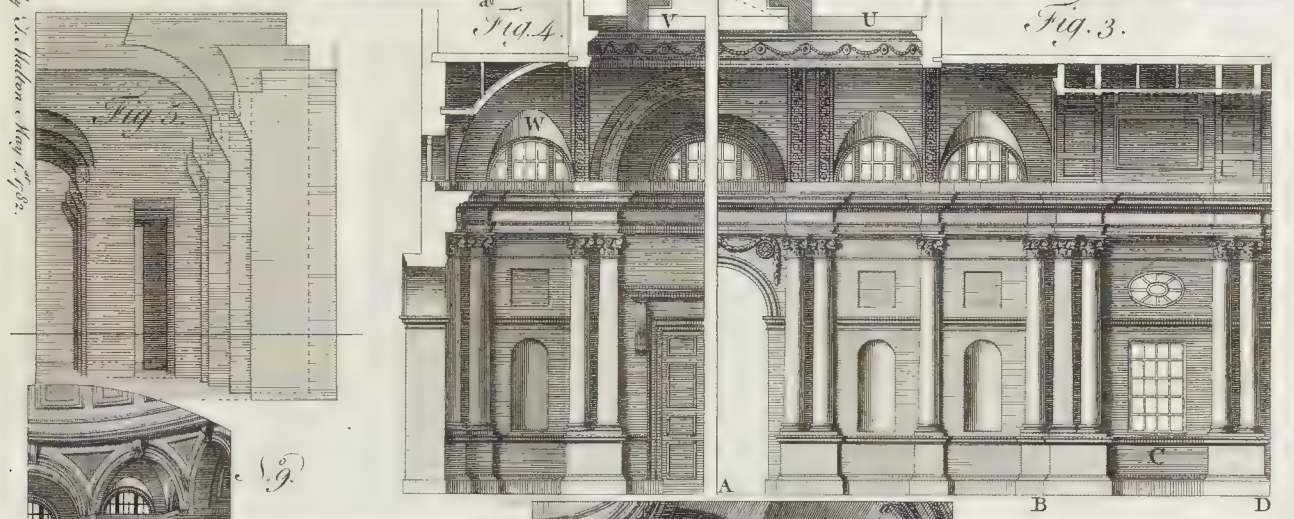
In viſiting the Royal Dock-Yards, ſeveral Draftſmen there, ſeemed much to wiſh that I had given, amongſt the variety of other Subjects, a Ship, by the Rules of Perſpective; ſome of whom I made ſenſible, that if they were well acquainted with the Rules, and underſtood the Subject, clearly, with the knowledge they had of the geometrical Conſtruction of a Ship, which I had not (and therefore did not chooſe to attempt it, perſpectively) they might apply it as well to that Object, as ſeveral other in the Work. For, although there are few or no Right Lines in its conſtruction, that are principal in it, yet it is eaſy to imagine Lines or Cords ſtretched from one part to another, fore and aft, horizontal and parallel, or otherwiſe, at pleaſure; alſo latitudinally, from any Part to its oppoſite; by which means, as many Points may be aſcertained, in any Curve, as are ſufficient to deſcribe it with accuracy, and that is all which can be done, by Perſpective.

Speaking of this to a Perſon of great Abilities and Genius in Ship-painting, he ſhewed me a Book on Ship Building, by Mungo Murray, Shipwright, in his Majeſty's Yard, at Deptford; publiſhed in 1754, which I find to be not a ſuperficial, or meerly an ingenious production, but in which is diſplayed a depth of reaſoning on the Subject, beyond what I expected from it; and, ſurely, the Subject requires it, being, in my opinion, the moſt wonderful and extraordinary Conſtruction in the World. I beſtowed a little time on it, to make myſelf ſo far acquainted with the external form, as was neceſſary for its Delineation, for which the outward Figure, only, is needful; the mechanical Conſtruction being, in order thereto, nearly of the ſame uſe, as the Anatomy of the Human Body to the delineation thereof. Indeed, anatomical Diſſections of a Human Body cannot in any wiſe conduce to its Delineation, in the variety of Attitudes, that are given to it; but, in the other Caſe, the Anatomy of a Ship may be conducive to it; at leaſt, by means of various latitudinal Sections, the true Contour of a Ship may be deſcribed, in any Attitude, or Poſition.

Although by ſtrength of Genius, and having a thorough knowledge of, or rather, being well acquainted with the outward form of a Ship, by a familiarity with it, it is poſſible to delineate it in all the variety of poſitions it can exhibit; yet, where

Plate.V.





Published by J. Hatton, May 1.st 82.

where ſuch Genius is ſpontaneous, how much perſpective would contribute towards greater accuracy is ſo evident, that 'tis needleſs to uſe many words to enforce it. However, as I have no where ſeen (except in the Work mentioned above) any attempt to lay down Rules for the Proceſs, they are more excuſable; but, that they may be no longer ſo, I ſhall, here, lay down a few principal Rules, which, being well underſtood and applied, will be found to produce the deſired Effect.

In order thereto, it is abſolutely neceſſary, to have a correct Plan and Elevation, geometrical (as it is for every Object we are not very familiar with) alſo, ſeveral latitudinal Sections, between the Head and Stern, at equal diſtances, or otherwiſe at diſcretion; one, particularly, in the Midſhip, from which others may be ſet off, towards Head ot Stern, at pleaſure; by means of which, the true raking and curve of the Wales and Gunwale, &c. may be obtained, and that is the chief object; by means of which, the true Contour of the exterior Surface, which limits the figure of the lower part, can only be deſcribed.

The firſt Figure, Plate 6, exhibits the Elevation of a Ship, in Profile, i. e. its Projection on the Sheer Plane; below which, at No. 2, is the half Plan, its Projection on the Floor Plane; and at No. 3. is a Section through the Midſhip, i. e. at its greateſt Swell; this is called the Body Plane, on which all the other Sections are projected; on the left hand the Sections of the Fore Body are drawn, thoſe towards the Stem; and on the Right, of the middle Line, are the Sections of the After Body, thoſe towards the Stern, deſcribed. By means of thoſe Sections, being deſcribed in Perſpective, all the Curves of the Gunwale and other Borders, Mouldings, &c. on the Surface are deſcribed; which Curves being projected on the Picture, by the imaginary interſections of Viſual Rays from various Points in the Curves, give the perſpective figure of the Ship. The perpendicular Lines in the Elevation, denote the places, and diſtance of thoſe Sections from the Midſhip and from each other. Plate VI Fig. 1.

Fig. 2. is an entire Plan, on which, ſuppoſe the Ship to be ſtanding on its Keel, and viewed from the Station D; AB is the Section of the Sheer Plane on the Floor Plane, which determines its Poſition in reſpect of the Picture, of which, A V is the Interſection; and DC is its Diſtance. Q G, P H, &c. are the ſeveral Sections, on the Floor Plane, at right angles with the Section of the Sheer Plane, which being produced to the Picture, give the interſecting Points R, S, &c. V is the Vaniſhing Point of horizontal Lines parallel to the Sheer Plane; the other Vaniſhing Point (of the horizontal Lines of the Sections) runs out of the Picture. Theſe Preliminaries being ſettled, which it muſt be obvious is the ſame as for any other Object, we now proceed to the perſpective Plane. Fig. 2.

Let C V be the Horizontal Line, and ſuppoſe the Eye to be elevated above the Deck, equal to c h, in the geometrical Elevation; the chief difficulty ſeems to be in determining an Interſection, which, I imagine, ſome make uſe of the Ground Line for that Purpoſe; and after having drawn a perſpective Plan, by means of Perpendiculars from ſundry Points taken therein, would find the repreſentations of various Points elevated to certain heights above the Ground Plane, as in Fig. 12. Page 24. according to the old Authors, which in ſuch an Object as a Ship, would be a moſt laborious Operation; therefore, I ſhall endeavour to abridge it, by imagining a Plane to cut the Picture horizontally, on a level with the Gunwale in the Midſhip, from which, the meaſures of what is above or below it may be applied. Indeed, under certain Circumſtances, the Ground Line and Plane, which is the ſame with the Floor Plane, may be uſed, and will anſwer every purpoſe of the other, being properly applied; as when the Eye is but little above or below the Gunwale, in which caſe, it is the very ſame thing as taking another Interſection, and forming a Plan, at a convenient diſtance from the Horizontal Line, as it is frequently exemplified in the Work. Fig. 3.

In the firſt place, then, let AB be the Interſection of the Floor Plane with the Picture, and C V the Horizontal Line, elevated above the Gunwale; the Center of the Picture being determined, at C, ſet off the diſtance of the Vaniſhing Point V, of Lines parallel to the Keel, equal, or in any other proportion to C V, Fig. 2.

Plate VI. Fig. 3. As the Scale of this Drawing is double of the other, take C V equal twice C V, Fig. 2. the Vertical Line, C D, being drawn, ſet off D A, equal to twice A C, Fig. 2. and draw A V. Find the places, a, b, c, &c. of all the Sections, perſpectively, on A V. (Prob. 8. Sect. 4. B. 3.) through which, draw Lines to the Vaniſhing Point of horizontal Lines in thoſe Sections (which are at right angles with the Keel, i. e. perpendicular to the Sheer Plane) which runs out of the Picture, by Prob. 13. Sect. 3. and, on thoſe Lines deſcribe, perſpectively, the ſeveral Sections at No. 3; the half Section, on this ſide the Keel-Line is ſufficient, as the larboard Side of the Ship, only is ſeen; ſave at the Bow, where the Section muſt be entire; the Sections, at No. 3, being numbered, according to their order, in regular ſucceſſion, ſhew which is the Original of each perſpective Section. The firſt only is entire, and expreſſes the Curve marked 1, in No. 3, on both ſides; the two next expreſs thoſe on the fore Body, inverted. The Line H P, Fig. 2. being in the greateſt ſwell, is the Section of the Body-Plane, and is the ſame on both ſides, at No. 3.; the other two, towards the Stern, are exhibited as if the Stern was towards us, which, in the Perſpective recede; but the Curves are the ſame, and the Sections follow as above.

It is almoſt ſuperfluous to ſhew how thoſe Sections are deſcribed, being the ſame as deſcribing any irregular curved Figure, by means of its proper Vaniſhing Line; which muſt be drawn through the Vaniſhing Point on the left hand (which is out of the Picture) perpendicular. For the midſhip Section proceeds thus. At the interſecting Point (S) of the Line P H draw a Perpendicular; on which ſet up, from S, the ſeveral heights, from No. 3. that is double; and having determined the perſpective Seat of each, at *a*, *b*, *c*, and *d*, and Perpendiculars being drawn thereon, draw lines from all the meaſures on S T, to the Vaniſhing Point, on the Left, cuting them, at *e*, *f*, *g*, and *h*, through which the Curve may be deſcribed, as in the Figure; and, after this manner, all the other Sections may be deſcribed. But if the interſecting Point be not within compaſs, the ſame Perpendicular, at S, may ſerve for any other; by drawing a Line from S, through the Seat of any perpendicular Line in the Section, to the Horizon, as S j, and, from T, draw another Line to the ſame Point, E, which gives the height of the Gunwale at *d*. By the ſame means, any other height, in any of the Sections, may be obtained; alſo, any other Perpendicular, on the Ground Line, will anſwer the ſame purpoſe.

Theſe Sections being obtained, a fair curve Line paſſing through the correſponding Points of each, will repreſent the ſeveral Lines in the Wales or Borders on the Sides of the Ship, Mouldings, &c.; the Curves of which vary according to the ſituation of the Eye; and as they are not plane Curves, they cannot be deſcribed as other plane Figures, by means of a peculiar Vaniſhing Line. The Draughtsmen, who can lay down, in Plano, the true Section of every part, could probably determine a Section parallel to the Picture, at the Bow, where a right line from D, the Station, touches it, at E, which, if the Eye was on a level with it, would be the apparent Contour at the Bow; but, as the Eye is elevated, in this Picture, it would not, as the ſwelling of the Bow, beyond it, would be ſeen over it. From the Stern, the apparent Contour is deſcribed over the bend of the ſeveral Sections, down to the Bottom; and by no other means does it appear, to me, practicable, or poſſible to be deſcribed, with any degree of accuracy.

The curves of the Mouldings, on the Gunwale, &c. being obtained on the hither Side, the oppoſite being ſeen, may be deſcribed, thus. From the Points *a*, *b*, &c. draw lines to the Vaniſhing Point on the left hand, and determine their apparent lengths, from their known meaſures, as at Fig. 2; by which means, as many Points may be obtained, in the Curves as are neceſſary to deſcribe them. The Lines on the Decks alſo, where they are ſeen, muſt be obtained after the ſame manner, from a geometrical Section by the Sheer Plane, as at No. 4.

The Water Line, l, m, n, o, is in a horizontal Plane; its geometrical figure being determined, on the Floor Plane, the perſpective figure may be found, by means of the horizontal Vaniſhing Line, in the ſame manner as the general Plan on the Floor Plane. Or it may be determined by the Sections; for, if c d, No. 3, be ſuppoſed

ſuppoſed the ſurface of the Water; then where it cuts the ſeveral Sections, at 1, 2, &c. perpendiculars being drawn to the Floor, determine the diſtance of each, from the Section of the Sheer Plane; and being all of equal height, they are readily transferred to the perſpective Sections, as the other meaſures thereon.

To determine the Gun-Ports, with accuracy, would be rather a troubleſome Operation; nor do I ſee any other way to effect it, than by deſcribing the Curve of the Deck they are on, which is not a Plane Floor, or rather the Curve of the Line they are in, at the proper height above the Deck; which, on account of the Sides battering, or bending inward, in this part of the Ship, will fall within the line of the Deck; which being deſcribed, and their places determined in it geometrically as at *A*, *B*, &c. No. 2; then, determining their places on the perſpective Floor Plane, (the curve Lines being drawn on the Side of the Ship, for the top and bottom Lines) Perpendiculars from them, will cut the Curves in their proper places.

In the fourth Figure, the Ship is repreſented as ſeen from an Eminence, as on the fore or main Top, &c. of another Ship, or from a Cliff, on Shore; or it may be ſuppoſed, that, the Sea being violently agitated, the Ship is deſcending towards us, on a large Billow; as the Effect would be nearly the ſame, and, in an Object of this kind, the difference would ſcarce be diſcernable; in a right lined Object, it would be very obvious; for, the Horizontal Line would croſs the Object, which is now elevated above it, and all perpendicular Lines, in the Object, would tend to a Point at a diſtance below the Horizon, which, in this caſe, will be perpendicular, and conſequently, parallel amongſt themſelves; but, as there are no perpendicular Lines, on the outſide of a Ship, and thoſe on the Deck are ſo very ſhort, comparatively, it would not be diſcernable whether they tend to a diſtant Point, or are parallel to one another.

C V. Fig. 4. being the Horizon, at the intended height of the Eye, above the Ship, take A B for the Interſection, anſwering to the Ground Line in the other; and having drawn the Vertical Line, C D, ſet off D A as above, equal twice A C, Fig. 2. and draw A V, for the repreſentation of a horizontal Section of the Sheer Plane. Let the Interſection be ſuppoſed to paſs through the hither Angle of the Beak-head, near the Cat-head; then, imagining horizontal right Lines, or Cords ſtretched, from each Angle, parallel to the Sheer Plane, marking the place where F e cuts the edge of the Gunwale, (Fig. 1.) or the Floor Plane, No. 2. which are alſo expreſſed by the dotted Lines F e, and E h, in Fig. 2. the interſecting Point of the firſt being obtained, making A *G* equal to A *F* (twice A F Fig. 2.) draw *F* V and *G* V, indefinite, and make *Fe* repreſent its proper length (twice F e Fig. 1. or 2.) and from *e*, draw a line to the Vaniſhing Point on the Left, cuting the other at *b*; alſo *F E* being drawn to the ſame Vaniſhing Point, *E b e F* repreſents the Rectangle E h e F Fig. 2; and after the ſame manner, any number of Points on the edge of the Gunwale, and Rails, may be obtained, as are neceſſary for deſcribing the Curve *F a b c d e f* with accuracy; as for Example. Fig. 4.

To obtain the repreſentations of the points c and k, Fig. 2. Draw F c parallel to A B, and ſet off, from A, Fig. 4. twice A F Fig. 2. on both ſides, making A a and A b equal, at which Points a and b, draw ſhort perpendicular Lines, below the Interſection; and make a d and b c each equal to the height of the Line F e, Fig. 1. above the edge of the Gunwale, at c, and draw c V and d V; then, making *Fc* repreſent, perſpectively, twice F c, Fig. 2. and drawing a Line from *c* to the Vaniſhing Point, on the Left, cuting d V at *k* the Points *c* and *k* are obtained. The Points b and d deviate ſo little out of the Line F c, and are ſo nearly on a level with it, that 'tis needleſs to take any other means to obtain them, than by determining their diſtances on the Line *Fc* and transfering them to the other ſide.

The Point *f* is determined after the ſame manner, drawing a Line from f parallel to A B (Fig. 2.) cuting the Picture at n; then, making A e and A f, Fig. 4. each equal twice A n, Fig. 2. at which Points, e and f, let Perpendiculars be drawn, above the Interſection, and make f g and e h equal to twice f g, Fig. 1; from g and h draw lines to V, and make g *f* repreſent twice n f, Fig. 2; from *f* darw *f g* to its Vaniſhing Point, and thus, any number of Points may be obtained.

Plate VI. Fig. 4. The Sections, by which the Curves of the Wales, with the Contour of the Bottom, are described, must next be determined; as for Example; the Section *c Hq*, of the Midship, from the outer Curve of the Body Plane (No. 3). Draw H o parallel to A B, Fig. 2. cuting the Picture at o; then, making A j, Fig. 4. equal to twice A o, Fig. 2. draw the Perpendicular j n below the Interfection; in which, take the lengths of the feveral Perpendiculars, from the Line A B (No. 3) to the Curve, and apply each twice, on j n, from j, to k, l, m, and n, from all which draw lines to V; and having made j i equal to twice the height of A B from the Gunwale, draw i V, cuting *k c* produced, at *C*, where draw a perpendicular, cuting k V, l V, &c. at o, *H*, p, and q; from *C*, determine the Points, 1, 2, 3, on *c k* (the perfpective meafures of thofe Numbers, at No. 3) from all which, draw Perpendiculars; and from o, p, and q, draw Lines to the Vanifhing Point, on the left hand, cuting them in the Points *o*, *p*, and *q*, refpectively; through all which, a Curve, being defcribed, will repref ent a perfpective Section of the Midfhip. The point *H*, being in the greateft fwell, is in the Perpendicular.

All the other Sections, at *F*, *G*, *I*, &c. may be obtained after the fame manner; but as the operative Lines in this, cannot be rubbed out, as in drawing (being only pencel'd Lines) the operation of another, would render them both confufed; and 'tis eafy to apply the very fame operation to the reft as to this; however, by making another, towards the Bow, in dotted Lines, the Procefs may be traced out, by the former Defcription; a repetition of it would be ufelefs, confequently unpleafing.

Having defcribed as many Sections as are deemed neceffary, the Curves of the Wales and Mouldings may be drawn with a careful Hand; but, being furnifhed with variety of curved Rulers, they may be done much neater, and the Curves truer. The Contour of the Bottom is defcribed over the bendings of the Sections, which being carefully drawn, forms a fine, and fair Curve; which, with a low Horizon, and the Ship being confiderably more in profile, would be be loft infenfibly, towards the Stern, as well as in both thefe, towards the Bow; owing to the Sections being fharper, or not bulging fo much as in the Midfhip.

The Head, with the Harpins and Rails, it would be a moft troublefome Procefs, to delineate by Rule, therefore I fhall not attempt it, but the Cutter, or Cutwater, being a plane Figure may be done; but 'tis not neceffary to be at the trouble, except to determine its projecture, and the height of the Bow, at the Head. Here, the whole of it is projected, as, in Fig. 2. it projects on this fide the Picture. Produce the middle Line (V A) indefinite, and make A *B*, perfpectively, equal to its projecture; draw *B D* and A *A* perpendicular, and make A *A* equal to its height, twice A a, Fig. 1. draw V *A* cuting the perpendicular, *B D*, at *D*, in the middle of the Bow; which being obtained, the whole Figure may, from the geometrical form, be drawn by hand, accurate enough; or as many Points may be obtained, after the fame manner, as is required; as, at 1 and 2.

The Cat-Heads may be thus defcribed, perfpectively, in their proper places. At Fig. 2. it is obfervable that the hither one, on the larboard Side, projects through the Picture, as the Cutwater, and muft be projected to it; in Fig. 1. is fhewn the raking, and inclination to the Horizon, though not truly, being confiderably foreffhortened. In Fig. 2. a Line being drawn, from one extreme to the other, as r s, the Picture is cut at t; make A r, Fig. 4. equal twice A t, Fig. 2. and, at r, draw a Perpendicular; make r s equal to the height of the ends, above the Interfection (twice the meafure at Fig. 1.) and through s, draw a Line to the Vanifhing Point on the Left, indefinite. Make s *r*, and s *s* perfpectively, equal to twice t r, and t s, Fig. 2. then, find the Point *u*, which repref ents u, in the Floor-Plane (Fig. 2.) where the Cat-Heads, being continued, would meet, on the Deck, or elfewhere, and draw *r u*, and *u s*; not in parallel Lines, but allowing, difcretionally, for their receding, as tending to their refpective Vanifhing Points; which, if required, may be found, by Prob. 4. and 5. Sect 3. Book 3.

The Chains to which the Shrouds are faftened, as at X, Y, and Z, Fig. 2. may be determined on the Picture, by drawing lines, from D, to the extreme of each, cuting the Interfection, at x, y, and z; the places of which may be transferred to

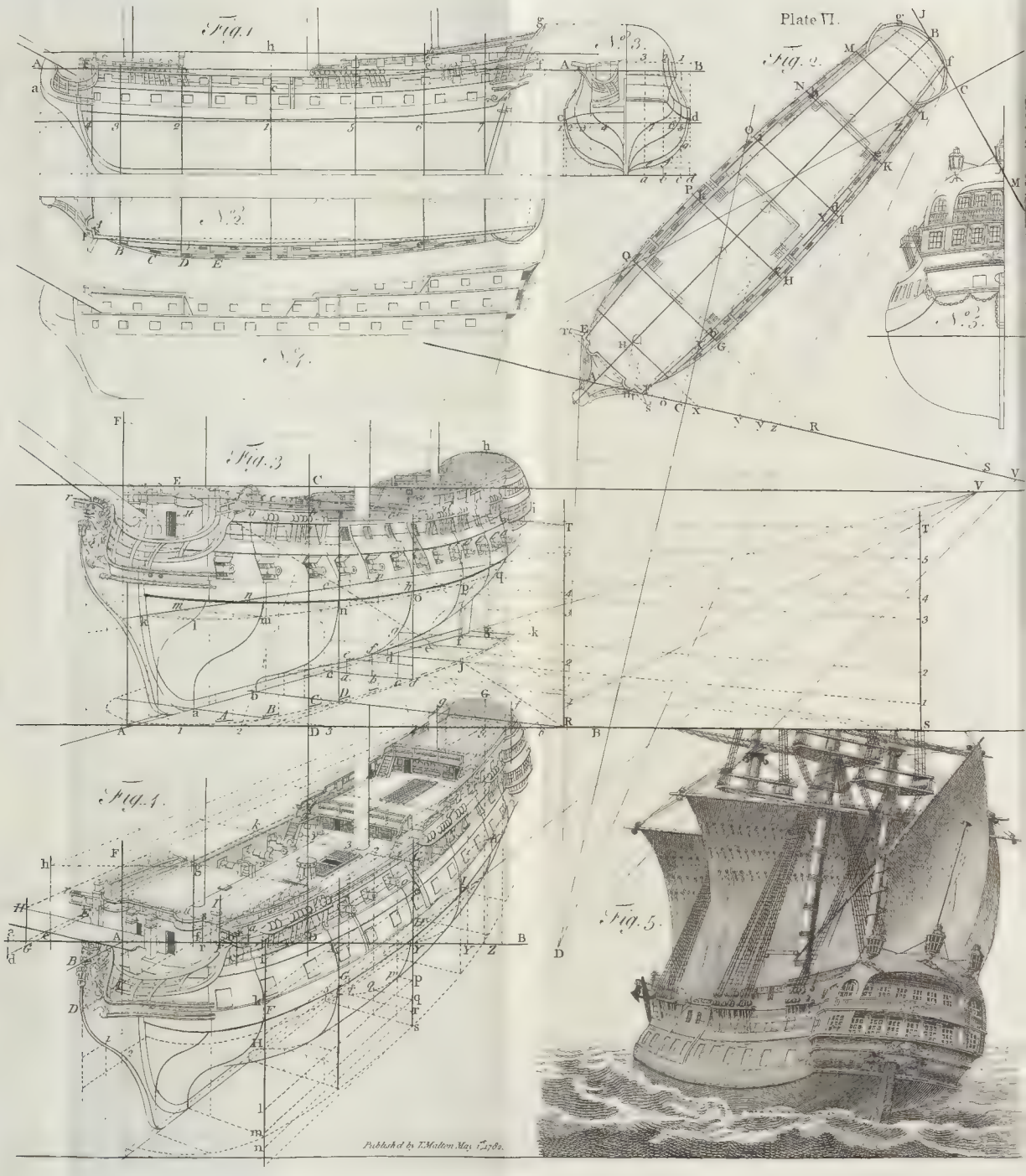


Plate VI.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Published by T. Mutton May 1st 1782.

the Picture, having already described the Curve, on the Side of the Ship, in which they are; making each, from A, Fig. 4. double the measure from A, Fig. 2. at *X*, *Y*, and *Z*; otherwise, their places may be found in the Curve, by drawing perpendicular, or other parallel Lines, to the Intersection, AV, and transferring them to the Picture; then, drawing Lines to the Center, or other Vanishing Point, cuting the Curves, in their proper places, perspectively. Other Minutias, with the Ornaments, &c. may be drawn by hand, either from a real Ship or Model; but when that cannot be had, their places may be ascertained, and drawn correct enough, by a Person who has judgment in drawing. These Figures, were projected in Perspective, entirely from the geometrical Drawings, at Fig. 1. without the assistance of either. The Gun Ports, though determined by rule, in Fig. 3. may be obtained, perhaps more accurately, by the same means as the Chains, above; and so indeed may all the parts of the Figure, projected on the Floor-Plane, at Fig. 2. as in Vignola's first Rule.

The interior parts, on the Deck, which are seen, with the Quarter Deck, and other Erections, as they are regular, and mostly right lined, there is nothing peculiar in their projections on the Picture; therefore, I shall say nothing more respecting them, than that, their true places being obtained, Rules sufficient have been given for projecting them. The places of the Masts being given, in Fig. 2. and indeed, of every other Object, on the Decks, may be best obtained by the above method, and with accuracy, respecting their apparent magnitudes and places, towards the right hand, or the Left; also, by a proper Elevation, their heights on the Picture may be had; and with the assistance of Vanishing Points, for the direction of certain Lines, it is perhaps the best calculated for such Objects.

From what has been done and said, it is evident, that the Rules of Perspective may be applied to the projecting, or delineating a Ship; yet, I am far from supposing, that a Ship-painter would be at the trouble of drawing every Ship he paints, by those Rules; by no means, but this I would advise him, to go through the Process in one, or two, in different positions; by which he would acquire a greater facility in describing the variety of Curves, which compose a Ship; as his judgment in them (being thus truly projected) would be much improved, his Eye would be more competent in judging of their various appearances, in different positions, and, in many respects, he would find great advantage, to his natural Genius, result from it. As in every Picture there is always some principal Object, I would also advise him not to trust wholly to his Eye in delineating them, but make use of Rules, to give the general form and proportion of the parts to each other; and with this Advice I shall beg leave to conclude this Section; for if I was disposed to treat the Subject ever so fully, all that could be said or done, more, would not make it better understood.

At Figure 5. is given another Ship, with its Stern towards the Eye, somewhat more inclined to the Picture, floating; an account of the height of the Stern, and the Eye being on a level with it, nearly in the middle, very little of the Deck is seen; the Contour of the Bow, in this position, is a graceful form, when truly described. In respect of the Rigging, but little can be done by Rule, except in giving the heights and proportions of the Masts, &c. but even in that respect, as, in Sea-pieces, the Distance is generally considerable, the proportion of the parts to each other, is nearly geometrical, the perspective gradation affects them very little, at such Distances. Fig. 5.

The Right Line JM, Fig. 2. is the position of the Picture respecting the Ship in this View; the Center is at C, and the Distance 12 inches, double the other, but drawn to a less Scale. No. 5. is the geometrical proportion of the Stern, to which it is drawn.

PlateVII

SECTION VI.

Of the Utility of PERSPECTIVE in LANDSCAPE-PAINTING.

IN this Section, I intend to ſhew, in what reſpects Perſpective may be uſeful to the Landſcape-Painter; which is more ſo than many may imagine. Reſpecting the general Deſign, if it be a Portrait, there are certain Preliminaries neceſſary to be ſettled, according to Rule, before he can begin drawing, which cannot be diſpenſed with. In the firſt place, the Station muſt be fixed on, and the height of the Eye determined, from which he muſt never deviate, in the leaſt; he muſt next determine, what extent he intends to take in, which ſhould not be more than can be ſeen diſtinctly, at one View; I do not mean, without moving the Eye, for that would be but a very ſmall compaſs, but without moving the Head, not exceeding an Angle of 50 degrees at the moſt, if but 40, the better; for determining which, the perſpective Compaſſes, mentioned in the 27th Page (which, by means of an Arc of a Circle, properly gradated, ſhews the Angle) are conveniently adapted. Then, having determined the height of the Horizon of his Piece, the Center being in the middle of the Picture, he muſt note particularly, what Object, or what part of the View will fall there, which may alſo be determined by the Compaſſes; fixing them at half the Angle of the whole extent, and then, applying one Point to either extreme of the View, mark where the other Leg directs, and that will be the Center of the View.

Having proceeded thus far, a Ground Line ſhould be drawn on his Paper, in proportion to the height of his Eye, from the level of the Ground where he ſuppoſes his Picture or tranſparent Plane placed; and in this, I am perſuaded, many Artiſts err greatly, by taking into the Picture all the Ground they ſee, even to the place where they ſtand, which would be infinite on the Picture; when, properly, no more than what is beyond the Picture ſhould be introduced; but, occaſionally, more may be added, with Diſcretion. The height of the Eye, i. e. the Diſtance between the Ground Line and the Horizon, on the Picture, ſhould be in proportion to the Diſtance of the Picture, and conſequently to its width or length. To make this better
Fig. 1. underſtood; ſuppoſe I intend to take into the Picture all the Ground I ſee beyond the diſtance of 30 feet, from D, the place where I ſtand, and there, ſuppoſe a tranſparent Plane, erect, large enough to take in the whole View; the Diſtance (CD) being 30 feet, and the Optic Angle ſuppoſed 50 deg. the width of the Picture (AB) will be nearly 28 feet, for which, the height of the Eye is 5 feet. Now, ſuppoſe the Picture brought nearer the Eye, to the diſtance of 10 feet; conſequently, the width of the Picture (ab) neceſſary to take in the ſame extent of View, will be about 9 feet 4 inches, for which, the height of the Horizon will be but 20 inches; which height of the Eye, for a Picture of that width, would be rather too little, and if the Ground be level would not riſe ſufficiently on the Picture; in which caſe more Ground may be added, below the Ground Line, or it would be too flat, and the Buildings be low in the Picture. Theſe neceſſary Preliminaries being ſettled, with judgment, the Artiſt may then proceed to the delineation of the Objects and Landſcape before him; notwithſtanding which, if he has not ſome knowledge in the Principles, and perſpective proportions of Objects, 'tis a great chance if he produces either a natural Portrait of the Place, or a judicious Picture.

In Compoſitions, a knowledge of, or ſome judgment in Perſpective is ſtill more neceſſary; for here, the proportions of the Objects and the parts of the Picture to each other, muſt depend wholly on his judgment, not having the Objects before his Eye to draw from. In the former Caſe, the Artiſt having taken his Sketch by ſight, and though he ſuppoſes that he has delineated the Objects as they appeared to him; or if from Fancy only the Deſign be produced, we are, in either Caſe, very liable to be impoſed on, in judging of their proportions, thinking them very

correct; when, being tried by the Touchſtone of Perſpective, they may be found very imperfect. This I experienced, myſelf, in the Compoſition of the Landſcape exhibited in the 7th Plate; for, after the Sketch was made, and appeared tolerable, reſpecting the Cottage, the Bridge, and Figures, it is ſcarce credible how imperfect they were, before I corrected them by Rule.

This being the caſe, it may be aſked, of what conſequence, then, is Perſpective, ſeeing that it is not eaſily perceived whether it be truly delineated or not? I anſwer, that although it may appear paſſable, in the laſt inſtance, not being accurately examined; yet, when truly drawn, the difference can ſcarce be imagined; of which I ſhall give an Example, hereafter, from the Performance of an Artiſt of the firſt Claſs. In reſpect of Trees, except when they are regularly planted, Perſpective can be of no uſe in delineating them; and then, it can only aſcertain their places, but in no wiſe their Figure or true Dimenſions; yet are they not wholly exempted from its Juriſdiction. The irregular courſe and windings of Rivers, the unevenneſs of the Ground, and irregular dimenſions of Hills, and Mountains, &c. of which Landſcape is compoſed, are Subjects, to which Perſpective is not applicable, ſo as to be delineated by its Rules. But, when Buildings, of any kind, are introduced, and more eſpecially when the Building is principal, in the fore Ground, as the Cottage in the 7th Plate, it is then that Perſpective will be found abſolutely neceſſary, and cannot be diſpenſed with, if the Artiſt has any regard for his Reputation. It is alſo eſſential in proportioning Figures, human or brute, both in reſpect of other Objects and to one another; which are frequently very diſproportionate, and particularly in reſpect of their ſituation and diſtance.

In the firſt Piece, Plate 7, is a Cottage on the left hand; in which, although a rude Building, the parts muſt be proportioned to each other in ſome degree; and the Lines which compoſe it, though not abſolutely Right Lines, are meant as ſuch, and their tendency to ſome particular Point in the Horizon, or elſewhere, is ſtill diſcernable; and, although there are none which are really parallel, yet, thoſe which we know are underſtood to be ſo, it is but reaſonable that we ſhould treat them as if they were really ſo; though not with that ſcrupulous exactneſs as in a regular piece of Architecture, becauſe it is not neceſſary, in an Object of this kind. Shadows alſo, and the Effects of Light on Objects, are Subjects which cannot be wholly neglected, in this branch of Painting; the former lies immediately within the Province of Linear Perſpective; the latter is wholly Aerial; which cannot be confined within its Rules, but is ſubject to the invariable Laws of Nature; which, Painters of every denomination, who are ſtiled Artiſts, ſhould make their early ſtudy.

I ſhall juſt lay down a few Rules, from the firſt Elements of practical Perſpective, by which the Landſcape Painter may correct and regulate his Piece, on the Canvas, from the Sketch he has taken by ſight, or compoſed; for it is not poſſible to confine the volatile Ideas of an Artiſt to Rules, in giving or taking a Sketch; but thoſe Ideas, when commited to Paper, may be corrected and reduced to Rule, in ſome degree; and that, by a Perſon who is poſſeſſed of but a ſmall Share of knowledge in Perſpective; and which, being ſo eaſily attainable, muſt render that Artiſt wholly inexcuſable, who will not ſpare a ſmall portion of his Time, not from his Studies, but his Pleaſures, to obtain it.

In the firſt place then, it is a well known Principle, not only in Perſpective but in Optics alſo, that all Right Lines, which are parallel amongſt themſelves, appear to tend towards the ſame Point; in conſequence of this Law, in Viſion, all Right Lines, in Objects, which are not parallel to the Picture, actually do (or ſhould) tend to the ſame Point on the Picture; that is, on the Plane of the Picture, produced, if neceſſary. This, every pretender to ſome knowledge in Perſpective does know; and in that lies all their knowledge, frequently; yet, ſtrange to tell, they do not even apply that knowledge to practice, as I ſhall ſhew hereafter. In conſequence of this, it is found, by Experiment (but it is alſo demonſtrable) that all Lines which are parallel to the Horizon, and not to the Picture, tend to ſome point in the Horizon; then, having drawn the Horizontal Line of the Picture (Q V) apply a Ruler

Pl. VII. Fig. 2. Ruler to ſome principal Line in the Building; as AB, on the Ground (which is the longeſt) and mark the point V, where it cuts the Horizon; then, if CD, of the Ridge, tends to the ſame Point (ſuppoſing them parallel) it may be conſidered as their Vaniſhing Point; to which, all others, which are conſidered as parallel to AB and CD, muſt alſo tend; as FE, alſo JK, the Ridge of the Stable, with the Eaves, and the Line on the Ground, &c. The Horizon of this Piece is about 9 feet high, which PQ repreſents; wherefore, PS may be conſidered as the Ground Line; nevertheleſs, it is obſervable in the finiſhed Picture, that more Ground is added below it, and more might ſtill be added, if it were neceſſary; all which is underſtood as being projected to the Picture, ſeeing it is conſidered as lying on this ſide. The Line of the Eaves of the Houſe, being in the Horizon, cannot be made uſe of, to determine the Vaniſhing Point. The other Lines, in the returning Faces, on the Left, as GH, of the Ridge (projecting from the great Roof) IJ, of the Timber, in the End of the Building, and LM, the Beam over the Sign-Poſt, being all conſidered as parallel to each other, tend to a Vaniſhing Point on the left hand, which is out of the Picture; which being obtained, and the Center of the Picture being at O, the Diſtance is conſequently determinable; for it is a Mean-Proportional between the Diſtance of each Vaniſhing Point, from the Center, the Building being right angled (See Prob. 12. Sect. 3. B. 3.)

Next, I will ſhew how the parts of a Building, or other Object, may be proportioned to each other; ſome particular part being taken as a Scale, by which others may be meaſured; as, for inſtance. Suppoſe the height of the opening of the Door to be ſix feet; then, its width, with the other parts of the Building (their meaſures being known, or imagined) may be determined with great facility, and ſufficient accuracy, in the manner following.

Produce BA to the Ground Line, cuting it at P; draw PQ perpendicular, and from V, draw a Line through the top of the Door, cuting PQ at R; then is PR ſix feet, to the Scale of the Drawing. The next thing requiſite, is to determine the Point N, in the Horizon; by means of which, all Lines tending to V may be truly proportioned; it is thus determined, arithmetically. The diſtance of the Vaniſhing Point V from C, the Center of the Picture, is 4 inches, and the diſtance of the other, for the Lines GH, LM, &c. will be found to be 11 Inches, between which, the Diſtance of the Picture is a Mean-Proportional; conſequently, it is the Square Root of 44 (4 times 11) which is 6,63, or 6⅔ Inches, nearly; the Square of 4 (16) added to 44, makes 60, the Square Root of which (7,745, or 7¾ nearly) will be equal to NV. Or thus, geometrically. Take AB (Fig. 3.) any portion of the diſtance between the two Vaniſhing Points, viz. 15 inches; AB is a fourth part; then, make BC one Inch; AC will be a fourth part of 11 Inches, and C repreſents the Center of the Picture. Biſect AB, and on E, the point of Biſection, with the Radius AE or EB, deſcribe a Semicircle, cuting a Perpendicular at C, in D; CD is equal to a fourth part of the Diſtance of the Picture, and BD is a fourth part of NV.

Fig. 3.

The Point N being determined, through A and B, draw N*A* and N*B*, to the Ground Line; alſo, draw N*C* and N*D*, through the extremes of the width of the Door; then will *AB* be the meaſure of AB, about 21 feet, by the Scale PR of 6 Feet, and the width of the Door is *CD*, 3 feet. Now, if any of thoſe meaſures be known, or ſuppoſed to be more or leſs, making *AB* equal to the meaſure of AB, *AC* of A*c*, &c. thoſe meaſures, by drawing lines to N, will be obtained, perſpectively, on AV. (Prob. 7. Sect. 4. B. 3.) By the ſame means, the proportions of the Windows, of the Stable Door, &c. may be obtained. Or they may be otherwiſe obtained, from *bc*, the height of the Door, being known, without uſing the Ground Line, which ſometimes cannot be aſcertained.

Draw VU perpendicular to QV, and equal to NV; draw *a* U, through *d*; then is *ac* the width of the Door, in proportion to the height, *bc*; and by producing *bc* both ways, Lines drawn from U to A, and through B to F, will give the Points a and F; by which, aF is divided in the ſame proportion to *bc*, as *AB*, on the Ground Line, is to PR. (Prob. 8. Sect. 4. B. 3.)

Or,

Or, if the measure of *cd*, the width of the Door, be known, the other measures may be determined, without the Ground Line, thus. Draw A *B* parallel to the Horizontal Line, and take any Point, as X, in the Horizon, from which, draw Lines through B, *c*, and *d*, cuting A *B*, at b, c, and d, in the proportion they have to each other; so that cd being taken for 3 feet, the measures of A *c*, and *d* B, are A c and d b; for they will have the same ratio to each other, as *AC*, *CD*, *D B*, on the Ground Line; and may be made of any proportion, at pleasure; (P. 8. S. 4. B. 3.) If Lines be drawn from V, through *e* and *f*, the corners of the Steps, to A *B*; its measure, and distance from the House, are obtained on A *B*, in proportion to Ac, &c.

Next, I will shew how the Bridge, at a distance, may be proportioned, from its known or supposed measure, in proportion to the Cottage; its Vanishing Point is X, the distance of which, from the Eye, must be obtained, after the same manner as N V, above; or thus. Take a fourth part of the distance X, from C, the Center, and apply it from C to E (Fig. 3.); draw DF, which is a fourth part of its Distance; and being applied from X, towards V, runs out of the Picture *. F D being produced, gives the outward Angle BDG, which the Plane of the front of the House makes with the face of the Bridge; which is considerably obtuse, though it appears to be very acute, in the Picture; but, from the Vanishing Points V and X, the Distance of the Picture being known, or the Vanishing Point of GH (which A, Fig. 3, represents) it is demonstrable: the Angle of inclination, of the front of the House and the face of the Bridge, is B D E †.

Let AB, the Ground Line of the House (being continued to its Vanishing Point) be supposed to cut the face of the Bridge at C; which is, consequently, on a level with the Ground, at A B. Through C, draw a Line from the Vanishing Point X, of the Bridge indefinite; and through f, where it cuts the hither edge of the Bridge, draw *FG* parallel to the Horizon, and from *B*, where NB cuts A *B*, draw *B* V, cuting it at *F*; A V cuts the same Line at *E*. Wherefore, because *EF* is parallel to A *B*, and to the Horizon, and because *AE* and *BF* have the same Vanishing Point, *EF* represents an equal measure with A *B*; for A *E*, and *BF*, represent parallel Lines. Through g, where the Bridge is cut by C X, at the other end, draw V *G*, which gives the point *G*; consequently, *FG* is the measure of the whole length of the Bridge, in proportion to *EF*, which represents the width of the House, in front, about 21 feet; which, being about one third part of *F G*, consequently, the Bridge represents a length of 63 feet, or 21 Yards. Wherefore, if the measure of the Bridge be supposed, or known to be more, or less, making *FG* in the ratio required, in proportion to *EF*, it is readily effected. The proportions of the Arches and Piers are obtained, by drawing Lines from V, through *g*, *h*, &c. to *FG*.

The Church, which appears over the Bridge, is supposed to be on level Ground with the Cottage; its Front, in length, is considerably inclined to the Picture; nearly as DH to AB, Fig. 2; for, the Vanishing Point of the End, or rather Front of the Tower (i. e. of the horizontal Lines in it) is near to N; at E in Fig. 3.

The House, at Y, is large and lofty, and stands on lower Ground; its Faces are almost equally inclined to the Picture; which, although I have, heretofore, frequently, remonstrated against, as not being picturesque, is of no consequence here, at such a Distance.

The House at Z stands on an Eminence, from which a regular Slope descends to the River. The Front is more inclined, that is, nearer to parallel with the Picture than the Church; its Elevation is strongly marked, without any assistance; but, in Fig. 2. it may be observed, that the Horizon is considerably below the Foundation, which is a certain Indication that it stands on high Ground.

For proportioning the Figures, proceed thus. Through s, the Seat of the Crown of the Man on Horseback, draw V S (from any Point in the Horizon) cuting the Ground Line at S; draw S T perpendicular, and equal to the known height; also, draw s t perpendicular, and T V cuting it, at t, the perspective height, in its deter-

* I would advise the Reader to produce C V, beyond the Plate, and mark the Point thereon.

† This Diagram may be drawn in any other proportion to the Picture; a third, half, or equal.

Plate VII mined place. Or without the Ground Line, from the known height of the Door. Draw a Line from s, through *b* or *c*, at the bottom of the Door, to the Horizon; or, to bring it within compaſs, draw sQ, at pleaſure, cuting AB at h, and make hi equal to the known height, in proportion to the Door (being ſix feet) by making *c*j equal to eight feet, and drawing jV, cuting hi, then draw Qi, cuting st, as before. The other Figures may be obtained after the ſame manner, by drawing a line through *r* and *t* to the Horizon, cuting it at V, and the Ground Line at s; then, making sf equal to their height, draw fV, which determines them. Or, if the height be ſet up on ST, at u, and uV being drawn, from *r* and *t* draw lines parallel to the Ground Line, cuting SV at r and t, where draw Perpendiculars, as rv, which gives the ſame height for the Figure *rs*, &c.

It would be ſuperfluous, here, to give more Examples, as it muſt be obvious, that every other kind of Figure, or Object, are proportioned after the ſame manner.

Reſpecting the Shadows; the figures of ſuch as are right lined, and being projected on plane Surfaces, may be readily aſcertained; thoſe of the Figures, being, in themſelves, irregular Surfaces, determined, abſolutely, by no determinate Outline, but varying in every different poſition and attitude; and being, generally, caſt on uneven Surfaces, their length only, according to the determined ſituation of the Luminary, can be given, or determined; or indeed of any Object, as the Cart, being projected on an uneven Surface, ſuch as a rough Road.

In the Introductory Preface to the fourth Book, of the Work, are given ſome, I preſume uſeful, remarks on Light and Shade, in general; and in the ſecond Section is diſplayed as much of the Theory of Shadows, as I conceived neceſſary to an Ar-Artiſt; ſhewing the origin of Shadows, the cauſe of Paralleliſm, in thoſe projected by the Sun, as they are in Nature, to us, always, at the ſame Inſtant; alſo, their Paralleliſm, in a certain ſituation of the Luminary, on the Picture; together with ſome fixed and invariable Rules, for determining the Vaniſhing Points of the Shadows of right Lines, on Planes, in every ſituation of the Luminary, reſpecting the Picture; which, being clearly underſtood, will be found to facilitate the operation of projecting Shadows, greatly; and in the two following Sections, Rules are laid down for projecting Shadows by the Sun, fully and generally. Therefore, as that part of the Work is rather conciſe, yet full, I ſhall not enter on it again, here, but refer the Reader, who is deſirous of being competent in it, to the Work itſelf, and only ſpeak of the Projection, ſimply, of the Shadows on the Building.

In this Picture, it is obvious, that the Luminary, projecting the Shadows, is on the other Side of the Picture; which, in ſome Caſes, viz. when its Altitude is but little above the Horizon, and its Declination from the Vertical Plane of the Picture, is ſuch, that its Image is repreſented in the Picture, is, of all other, productive of the worſt Effects; but, here, although its Image (which is the Vaniſhing Point of the Rays of Light) is on the Plane of the Picture, it is ſo far diſtant (on the right hand) from the Center, that the Rays of Light, by which the Shadows are projected, approach nearly to Paralleliſm; as when it is in the Plane of the Picture; which, laſt Caſe, being attended not only with the leaſt trouble, but knowledge alſo, is moſt generally adopted, when the Shadows are projected by Rule.

⊙W, being drawn, projecting the Shadow of the hither corner of the Eaves of the Roof, on the Stable-Door, at w, may be conſidered as a given Ray of Light; but the place of ⊙ is, in that direction, about 24 inches from the Center of the Picture; wherefore, all the other Rays, paſſing through F, G, L, &c. are conſidered as diverging from that Point; which being ſo far diſtant, they are nearly parallel to ⊙W. Thoſe Lines being drawn, let the Shadow fall on whatever Surface it may, the Shadow of the Angle, or Point, it paſſes through, muſt neceſſarily be in that Line, as at *f*, *g*, &c. the Vaniſhing Points of the Lines FG, GH, &c. being obtained (Prob. 4. Sect. 3. B. 4.) *fg* and *g*H being drawn, limit the Shadow of thoſe Lines. The Shadow of the perpendicular Line at F, and of the Chimney, have the ſame Vaniſhing Point; but the Shadow of the Beam LM, and of the Ridge GH, being projected on Planes differently poſited in reſpect of the Horizon, though parallel between

between themſelves, have different Vaniſhing Points. The Vaniſhing Point of the Shadow of the Sign Poſt, and of all perpendicular Lines on the Picture, being projected on the Ground, is in the Horizontal Line.

As, in the linear part, the Objects are leſs, at a Diſtance, and approach, nearly, to orthographical Projections, by reaſon of their riſing ſo little above the Horizon, the Vaniſhing Points remaining the ſame, they are conſequently at a greater diſtance, in reſpect of their proportion, and the Lines tending to them are nearly parallel; and as they ſubtend ſo ſmall an Angle at the Eye, there is little or no gradation in the parts, in receding Surfaces; ſo, in the aerial Perſpective, the parts are leſs diſtinct, as it is obvious in the finiſhed Piece, the Lights and Shades become inſenſibly mixed, and at a greater Diſtance, the whole is confuſed and imperfect. Larger Objects, which can be ſeen at a great Diſtance, particularly high Mountains, from the great quantity of Air ſeen through, become ſo ſlightly defined in the Outline, and their Surfaces ſo hazy and diveſted of Colour, ſave what the blueneſs of the Air gives, that they are ſcarce diſtinguiſhable from the open Air, or, as it is underſtood, and uſually called, Sky.

Having ſhewn, in the upper Picture, the great utility of, and a neceſſity for ſome knowledge in, Perſpective, to the Landſcape Painter, the lower Piece exhibits a few trifling miſtakes, which a great Artiſt may inadvertently commit; who, either for want of Capacity to comprehend, or a ſupine indolence in Diſpoſition, is ſatisfied to remain in total ignorance of ſo eſſential a requiſite, to a great Maſter; and, in order to palliate that Deficiency, has recourſe to the mean Subterfuge of depreciating, and attempting, on all occaſions, to invalidate the very Baſis of every imitative Art.

Although I have called them trifling miſtakes, with which this Performance abounds, and which may eſcape the Eye, and notice, of an injudicious and ſuperficial Obſerver, they are nevertheleſs, ſome of them, rather glaring to a judicious, and critical Eye; firſt, in reſpect of the general View, ſecondly in linear Perſpective, in the delineative part; thirdly, in reſpect of the Shadows; and laſtly, in Aerial Perſpective.

This Piece exhibits a View of Burton Conſtable, the ſeat of W. Conſtable, Eſq; in Holderneſs, the eaſternmoſt part of the Eaſt Riding of Yorkſhire, painted by G. Barret, Eſq; R. A. In the Year 1779 a Companion to it was exhibited to public View, at the laſt Exhibition of the Royal Academicians, in Pall Mall, which abounded with a few improprieties of a ſimilar nature; but the Building being ſeen at a diſtance, it was not ſo principal, in the Picture, and conſequently the imperfections were not ſo conſpicuous as in this; which is the 12th Plate of the entertaining and really valuable Cabinet-Collection of Views, engraved and publiſhed by Mr. Watts. Another, more capital, Piece was exhibited at the ſame time, which is alſo greatly defective in the repreſentation of the Building. It is rather to be lamented, that, in the Strictures and Criticiſms on the Works of Artiſts, at a public Exhibition, ſcarce any Remarks are ever made in reſpect of Perſpective; and it is to be wiſhed that thoſe important Gentlemen, the Reviewers, who criticize with ſuch judgment in other reſpects, would make themſelves acquainted with the rationale of Perſpective, which is as neceſſary to the perfection of a Picture, as Colouring, Light and Shade, &c. yet, Errors in Perſpective are wholly overlooked.

In reſpect of the Piece, now before the Public, I ſhall paſs over the great Impropriety, of Cattle grazing in a Meadow, fit for the Scythe, and overlook the nakedneſs of the ſtragling Trees in the Fore Ground, as it is a Portrait. The general Effect of the whole Piece, I ſhall leave for more competent Judges to expatiate on, confining my Remarks entirely to that part, in which I preſume to have a tolerable Competency, viz. Perſpective, Light and Shade, Shadows, &c. and, on thoſe I ſhall make my Obſervations, and give my Sentiments with freedom, but with Candour.

Firſt, then, in reſpect of the general View; I will venture to affirm, that the Author of that Piece, knows not in what part of the Picture is the Point of View, properly the Center of the Picture. I cannot ſuppoſe that he meant it to be ſeen in that Point, which the principal part of the Building indicates to be the Point of View; for, other parts of it direct us to other Points. It is, with me, an univerſal

Plate VII Maxim, that in every ſuch View, the Eye ſhould be ſituated directly, i. e. perpendicularly oppoſite to the middle of the Picture, reſpecting its length *; but that, the principal Object, abſolutely contradicts, and directs the Eye towards the extreme Edge, on the left hand; elſe, how could the Faces of the two Towers, at that End of the Building, be ſeen as they are here repreſented. Perhaps, in order to ſee the Building to greater Advantage, after having taken the general View, he removed his Station to the Left. It is eaſy to prove, from the concurrence of the Lines, in the Building, that the Station has been moved and removed, again and again; I will undertake to prove that there are not leſs than ſix Points of View in this Picture, as it is in the Original, of which this is a juſt and correct Copy.

This Subject has, heretofore, been diſcuſſed, by Mr. Highmore, in reſpect of the Cieling of the Chapel of Whitehall; in which I think it is aſſerted that there are nine Points of View; but as the Cieling is divided into as many Compartments there is no impropriety in it, each being conſidered as a diſtinct Picture, having very little affinity or Connection with one another. But what notion muſt that Perſon have of Perſpective, or what Judgment, as an Artiſt, who would attempt to draw, on one Picture, from two or more Stations; as is evidently the Caſe, in the Picture here ſpoken of.

For, firſt, I ſhall ſuppoſe the general View to be from the middle of the Picture; as I ſhould imagine, that every Artiſt intends his Piece (a Landſcape particularly) to be ſo viewed; or, I think, he would be at a loſs, to aſſign a reaſon why it ſhould not. But, as the Front of the Building is geometrically drawn (for the horizontal Lines, in it, are all parallel amongſt themſelves) I would aſk Mr. Barret, how it was poſſible for him to ſee either End of the Building in that Caſe? and eſpecially that which is ſeen? as the Vertical Line of the Picture paſſes directly through the extreme corner of the Tower on the right hand, at A; wherefore, the Corner B, of the Building which projects from it, towards the Picture, would be either in the ſame Line, or but very little on the right hand of it; as the oppoſite Building appears to project before the Tower, at k. Conſequently, neither of its receding Faces could be ſeen, as at D, but the oppoſite Face of the other Wing, on the Left, would be more ſeen than this now is. It is alſo evident, that, from the great projecture of thoſe parts from the Towers, the hither Ends, which are parallel to the Picture, and ſo much nearer to it, would be, at leaſt, one third part wider than they are, as it is manifeſt; for the Corner of the Tower, at A, cuts the Ground at a; wherefore, a right Line being drawn from the Vaniſhing Point, at E, through a, cuts the Ground Line, bc, of the hither End, at d, giving bd for its true perſpective width; provided it be no wider than the Tower; but, being wider, and being projected from F, the Vaniſhing Point of Lines, parallel to thoſe, in the End which is ſeen, (as it ought to be) it would be projected to e, and the left hand Corner would be at d, giving de for its width; the height would be in proportion.

It has been almoſt a general Cuſtom, with Painters of every Age and Country, when a Building of any kind is repreſented in their Picture to have ſome Face of the Building parallel to it; as may be ſeen not only in the Pictures, and Prints, copied from the old Maſters, in general; but alſo, in the Works of moſt modern Artiſts, till of very late Years, ſome few have ventured to go out of the long beaten Path. I would aſk thoſe who are Advocates for ſuch Repreſentations, as in this Piece; why Objects, caſually ſituated in reſpect of the general View, muſt neceſſarily be ſo repreſented? and why, as the Object is ſituated in the Original Picture, as above, the returning Face on the left hand ſhould be ſeen rather than the Right? I would alſo aſk, whether they imagine the Cottage, in the other Piece, would have a more pleaſing Appearance, if the horizontal Lines in the Front tended to the Center of the Picture (or Point of View)? which is not at V (Fig. 2.) where the Lines do tend, but at O; the End being parallel to the Picture, and conſequently all hori-

* As the Building is the chief Subject I mean to expatiate on, and the Landſcape has nothing ſtriking or intereſting in it, there is cut off, on the right hand, 5 inches, and about half an inch on the Left, in the proportion of this to the Original; there is cut off alſo, an Inch and 5 eights from the Bottom, exactly half the Ground as in the Original Picture.

zontal

zontal Lines in it, or parallel to it, as GH, LM, &c. would, in that case, be parallel to the Ground Line, i. e. to the Horizon. Those Pieces so justly admired, in other respects, of Canaletti's, are almost all so delineated; a proof, with me, that he was not competent in Perspective; I am in doubt if he knew much of it; not more, than a superficial knowledge, acquired from such Works as the Jesuit's, so undeservedly admired by Painters, for no other reason, that I can conceive, but because he does not attempt any difficult Cases, and that for the most cogent reasons.

The Prints. from Canaletti, evince the truth of what I have said. I have also seen two capital pieces of his, of Verona, in one of which, a Bridge crossed the Picture, parallel, in the Fore Ground (to express it in the language of a Painter; for it was Water.) I cannot conceive, that such an Object, so represented, is picturesque. I have also seen another Piece of his (or a Copy) of the Rialto, as designed by Paladio, in the same position; which filled the whole Picture, save an Avenue on the right hand, up a Street. Now, had he been thoroughly conversant in Perspective, I cannot imagine that he would have drawn it in that position, but oblique; which would have been far more pleasing and picturesque; though some would imagine that the Avenue could not, in that case, be seen; equally the same, and removed the Center, from that absurd situation, to its proper place. This Picture must have been drawn entirely by Rule; as the Building never existed, from that Design of Paladio's. In those Pieces which are Portraits of real Places, he might take them by Apparatus, in any position; the parallel being preferred for for no other reason, but to avoid trouble; although there is very little more in one than the other, being clearly understood, But, to return to the Subject in hand, from which this is entirely a Digression; but of such kind as bears an Affinity to it.

I have undertaken to prove, that there are not less than six Points of View for this Picture; which I shall certainly make appear, to any Person of judgment. The first and principal, for the general View, is at D, which is in the Horizon, and also in the middle of the Picture (see the Note, at the bottom of Page 60) but, the Building gives the direct Lie to that; one part says it is at E, another contradicts it, and says it is at F, a third at G, all in the Horizon; but, again, other Objects will have it to be at H, out of the Picture, on the Left, below the Horizon, whilst other parts of the Picture absolutely assert it to be I know not where, for the sixth I cannot find, yet can prove there is a sixth, as certain as the other five. But, before I begin the Scrutiny it is but reasonable that I should lay down a Position, by which the reasoning may be investigated; and, that others may have an infallible Criterion to determine from, as well as myself; it is as follows.

Dr. Brook Taylor, Gravesande, and other able Mathematicians, have determined the Center of the Picture to be in that Point, where a Perpendicular from the Eye of a Spectator would cut the Picture; which Point is called, by all the old Authors, and is still almost generally considered as, and understood to be, the Point of View. Now, it is demonstrated, by the Authors quoted above, and agreed on by all others, that all Right Lines, in Objects delineated, whose Originals have a certain position, in respect of the Picture, viz. that are perpendicular to it, shall tend to the Center, as Point of View (See Theo. 4. B. 2. and Cor.) This being, indisputably, the case, we must next determine, and clearly prove, which Lines, in this Object, i. e. in the Original, were so situated. In every right angled Parallelopiped, all the Lines joining the Angles of two opposite Faces are perpendicular to them; and, as the opposite Faces are necessarily parallel, it follows, that Lines being perpendicular to any Plane, are also perpendicular to any other Plane, parallel to the first. This every Geometrician will allow, though Euclid has not demonstrated it, directly; but it follows, from P. 14. 11. Eu.

The parts of every regular Building, below the Roof, are, in general, Prisms, and the principal parts are Parallelopipeds, always right angled; then, as the representation of every plane Figure, which is parallel to the Picture, is similar to the Original (Theo. 9. Cor. 5.) it follows, that the Plane Figure b f B c, and its opposite (X) being right angled, equal and similar Figures, have their Originals parallel to the Picture; wherefore, the receding Lines, f g, b h, i k, &c. must neces-

Plate VII farily tend to the Center, or Point of View; for their Originals were perpendicular to the Picture, and parallel amongſt themſelves, and conſequently ſhould have the ſame Vaniſhing Point (Cor. Th. 3. & 4.) But, the one vaniſhes in E, and the other at F, in the Horizon (for their Originals are horizontal Lines) therefore, E and F are two diſtinct Points of View, from the above Poſition.

Thus, I have proved two Points of View, E and F; and D, I preſume, is granted, therefore three; a fourth I ſhall prove at G, thus. By the Shadow on the right hand of the Door, there appears to be a projecture of the middle part, up to the top; I imagine equal to the two octagonal Towers; yet there is not the leaſt Appearance of either of the returning Faces; alſo, the octagonal Towers being delineated perfectly ſimilar, can no otherwiſe be accounted for, than by the Center being at G, or it may be in any part of a perpendicular Line, paſſing through G, to the height of the Building, ſeeing that, there is not the leaſt breaking of the Mouldings, from the Front, in the middle part, and but very little at the Towers. The fifth is eaſily proved, by the two detached ſquare Towers, at Y, towards the extreme edge of the Picture, to be at H, about nine inches out of the Picture, on the left hand. Laſtly as the general Horizon of this Picture, paſſes through the upper edge of the Moulding over the lower Windows, I would aſk Mr. Barret, if he could ſee ſo great a breadth of Ground at that height of the Eye, and ſo much over the Gentleman's Head, on Horſeback? for the original Picture, has twice the breadth of Ground, in proportion to this; and I preſume, that here is full enough; for it cannot be more than 12 or 13 feet high. Next, I would aſk him, by what means he was elevated to that height? perhaps he took his Sketch from a Tree; for I am of opinion, that there is no other eminence there. I know the Place, being within five miles of the Place of my birth; the Picture indicates a level Ground, and I know that the whole Country is ſo, for many Miles around, with very little variety; conſequently, he has another Horizon, for the Ground, above the Houſe; whereas, I durſt venture to aſſert, that he drew it at his own natural height, or perhaps ſiting, as it is moſt probable; the Towers, at Y, indicate it poſitively. Wherefore, as I cannot poſſibly tell at what height he drew the Ground, or what height is indicated by it, 'tis impoſſible to aſcertain the ſixth Point of View, yet there is one; or at leaſt five, granting this to be the general one, firſt ſpoken of, taken higher, and not in the Horizon of the Building, at D.

Here, then, are five Points of View, abſolutely determined; but, from the concurrence of the Lines, in the original Picture, I would undertake to prove twice the number; from theſe I have determined, it is evident, that the Station muſt be changed for each; as for inſtance. From the general Point of View, at D, in the middle of the Picture, it is manifeſt, that not one receding Face, in the Building, or the two detached Towers, which are ſeen, could be ſeen; at G, the oppoſite Faces of the two Wings, inwardly, would be equally ſeen, and one would be a Duplicate of the other; at E, the true Point for the right hand Wing, its oppoſite Face would be ſomewhat ſeen, inſtead of the outward, and of the Towers; at F they would all be ſeen, which are ſeen, but very differently; in all theſe four, it is plain, that the other Faces of the Towers at Y, would be ſeen, not the outward Faces, as here, from the Point H. But, what is very extraordinary, in theſe Towers, which extend from the far corner of the great Towers, to the full extent, or more, of the left Wing, and are joined by a long Wall, with a wide Gate, in the middle, into a ſpacious Court (which here is no appearance of) ſo that there is not the appearance of a third part of the ſpace between them, there really is, nor could the Tree (he has planted there) fill half the ſpace; much leſs ſcreen from ſight four Windows in the receding Faces, which appear wider than the great Towers, although they are much leſs; alſo, the farther one, of the great Towers, ſhews a much greater width, than the hither one; true, the Original is wider, but not in that degree; and, although the Eye, in the general Horizon, is conſiderably above the Towers at Y, yet their tops are not ſeen, but the Lines tend downward to H, below it, which ſhould be in the Horizon.

Here alſo, we find, that he has run counter to the firſt general and eſtabliſhed Maxim; for who (being an Artiſt) does not know, that all Right Lines which,

in the Originals, are parallel amongſt themſelves, and not to the Picture, tend to the ſame Point on the Picture? The Lines fg, bh, &c. and the Ridge at A, tend to E; the Lines ik, lm, &c. tend to F, and thoſe in the Towers, at Y, to H; yet their Originals are all parallel amongſt themſelves, and perpendicular to the Picture; which, almoſt every pretender to Perſpective knows, ſhould tend to the Center, or Point of View; this is the grand Arcanum, the *ne plus ultra* with dablers in Perſpective; yet, even that is diſpenſed with, here; for it is difficult to find three, which tend to the ſame Point*. I make no doubt, the Author of this Piece could, to a Perſon wholly unacquainted with Perſpective, and the Laws of Viſion, give a plauſible reaſon for his deviating, in ſo many inſtances, from its Rules; and in many more, which I mean to particularize, from the fixed and eſtabliſhed Law of Nature.

Thus much for the linear part, of the Building; of the proportion of the Trees, there can be nothing ſaid, nor of their Arrangement, unleſs we were on the ſpot; of the Figures I ſhall ſay a little. Firſt, reſpecting the Gentleman on Horſeback, in the Fore Ground; which, reſpecting the Building is about the natural height of a Man, and not more; but the height of the large Tree, in proportion as he is, is about 60 feet; yet it appears nothing extraordinary, compared with thoſe near the Building; the Towers may be 45 or 50. The Cow, grazing, is about 3 feet high which, I prove thus. At the Rump, draw *ef*, perpendicular to the Ground; draw *e*E and *f*E, to any Point in the Horizon; and where *f*E cuts the bottom Line of the Building, a Perpendicular, at *b*, cuting *e*E, is its height, in proportion to the height of the Window from the Ground; which, as there are no Steps at the Door, cannot, I preſume, be above 3 feet. The height of the other may be aſcertained after the ſame manner.

I ſhall, next, make ſome remarks on the effect of Light on the Building, which is ſo very abſurd, that 'tis impoſſible it ſhould paſs unnoticed. It is a general Law amongſt Painters, allowed I believe by all, that thoſe parts, being equally illumined, are the brighteſt which ſtand forwardeſt in the Picture. The Front of the Building is ſtrongly illumined; yet, the Wings, which project from it towards the Picture, many Yards, have their Faces, which are parallel to the Front, almoſt in Shade; and were it not for a faint Shadow being thrown on each, from the Bow Windows, we ſhould conclude them to be wholly ſo; the Towers at Y have their parallel Faces in Shade; and the part Z projecting from the left Wing, with the two ſmall Bows, at D, in the other, project Shadows towards the Picture, on the Building; which implies, that the Luminary is beyond it, and could not poſſibly, in that Caſe, illumine the Front. Probably, the Effect of one was taken before Noon, the other ſome time after. I ſhould be glad to aſk him, what Line projects the Shadow *ab*, on the Front, which proceeds from the Angle *a*, as it is here repreſented? The Line which ſhould project it is not ſeen; it runs from *a* to *c*, where it joins the Tower, in the ſame manner as fg in the oppoſite Wing, and not the Ridge of the Roof, for the Luminary is elevated above it; yet that would proceed from the Point o, where it cuts the Tower; the other cuts it at *c*; ſo that, the Shadow from either could not be ſeen, with that Altitude of the Luminary; for *ac* would project *cd*.

It will be no diſparagement to Mr. Barret, to ſuppoſe that he neither drew the Building, in this Picture, nor painted it himſelf; as it is a branch of Painting he has no pretenſions to, nor any of the requiſites for. Yet, whether his Brother or other Aſſiſtant, under his inſpection, executed the manual part, in this Piece, his deficiency in Perſpective, and, more particularly, his want of judgment in Light and Shade, are not leſs excuſable; the latter is unpardonable, ſeeng that, the Abſurdities I have particularized are obvious to every one (Artiſt or not) who has any pretenſions to judgment in either; and cannot be excuſed in a Painter in any degree of Reputation. I dare to ſay, that he would highly reſent the inſult, to have his Judgment, in thoſe matters, queſtioned; yet, I think it no robbery, but a ſtrict Juſtice to my Son, to tell it to the World, that the Buildings in two Pictures, for Lord Clive, of

* That it may not be imagined I have enumerated more Abſurdities than there really are in the Original, I muſt obſerve, to the Reader, who may have Watts's Views, that he has corrected the moſt glaring improprieties, in the View he has given of this Building, and made all the Lines tend to the ſame Point, which repreſent parallel Lines; for he is a judge of Perſpective.

Claremont,

Plate VII Claremont, in Surry, were both drawn and painted by him*; becauſe he rewarded him ſo liberally (with baſe treatment) and never, to this Day, got a Shilling of him, for the time he ſpent in Barret's ſervice.

It is but too much the diſpoſition of Mankind, in general, and Artiſts in particular, to arrogate to themſelves a Merit which is not their due, from the Works and Genius of others; and to aſſume pretenſions to a knowledge in what they are entirely ignorant of, and too indolent to beſtow a little pains to acquire. In Perſpective, I ſhall venture to pronounce this Artiſt wholly ignorant; he has, 'tis true, attempted to acquire ſome knowledge therein, without ſucceſs; for, either he could not have patience to perſevere, or rather, as it appeared to me, he was perfectly indocile, in ſcientific Art; being too volatile a Genius for ſuch a dry Study, as Artiſts, in general, term it; becauſe, being wholly unacquainted with it, and ignorant in the firſt requiſites to obtain it, they cannot feel and experience a true reliſh for it.

I do not mean, by this, to leſſen, nor have any deſign to depreciate the *real* Merit of Mr. Barret, which is *moſt* conſpicuous in his Works; it will perhaps rather redound to his Reputation, to ſuppoſe him an Artiſt, by Nature, whoſe Genius is entirely ſpontaneous†; I only mean to free him from an embarraſment, in reſpect of Perſpective, that his Admirers may not expect, or look for an excellence in his Works which is not there, nor he capacitated to give. To atone for which deficiency, he imagines, that to decry it on every occaſion, as unneceſſary to a Perſon of real Genius, in his Line (who ſhould not be tied to Rules) will acquit him to the World, for his Indolence in not making it more his ſtudy; at the ſame time, artfully inſinuating, that he is ſufficiently verſed in what is eſſential, imagining the Eye to be competent, and the Hand ſufficiently correct to delineate what is ſeen; which, I affirm, the moſt judicious Eye is not, nor even the Hand of a Barret.

I cannot conclude, without remarking on an Expreſſion of his to an Acquaintance of mine, his Frame-maker (after Boyle) who is much indebted to him for the ſight of his native Country, again. Having, heretofore, ſome epiſtolary Altercation with him, on account of his baſe treatment of my Son, and his contemptuous behaviour thereon, he took all opportunities to diſparage, and depreciate my Treatiſe, declaring that he would not read a Page of it, if I would give him the Work; indeed, I am of opinion that he would benefit little, by reading it. "Of what uſe is it (ſays he) is not every Object ſeen in Perſpective? (who knows not that) and ſurely, it is but to draw them as they appear." What conſummate Sagacity is this. I ſhall tell him, then, in few Words, that the uſe of Perſpective is to delineate Objects which we never ſaw, or never exiſted, with the greateſt exactneſs; and alſo, to draw thoſe truly that are ſeen, which neither Mr. Barret, nor thoſe who have much more judgment are capable of, meerly by ſight. And I would obſerve to him, that the Eye is greatly deceived in what it ſees, frequently‡; neither ſhould Objects be repreſented, in Perſpective, as they appear. I have ſhewn, and proved, that the perſpective Repreſentation of an Object, and its Appearance, are two things, which is not in the power of Art to unite on a plane Surface; and that, whether he can comprehend this wonderous Myſtery and apparent Paradox or not, it is ſtill ſo; or let him impeach my judgment in it, and hold me forth to public Cenſure, if I have not aſſerted a Truth, far beyond his futile Arguments; for it will ſtand, the Teſt of the ſevereſt Criticiſm, and ſurvive the Obloquy, and baſe Inuendos of ſuch Detractors.

Therefore, I think it a Duty, a ſtrict Juſtice to myſelf, to ſhew to the World, how far he is qualified to ſpeak of, to recommend or diſparage any Work on the Subject of PERSPECTIVE.

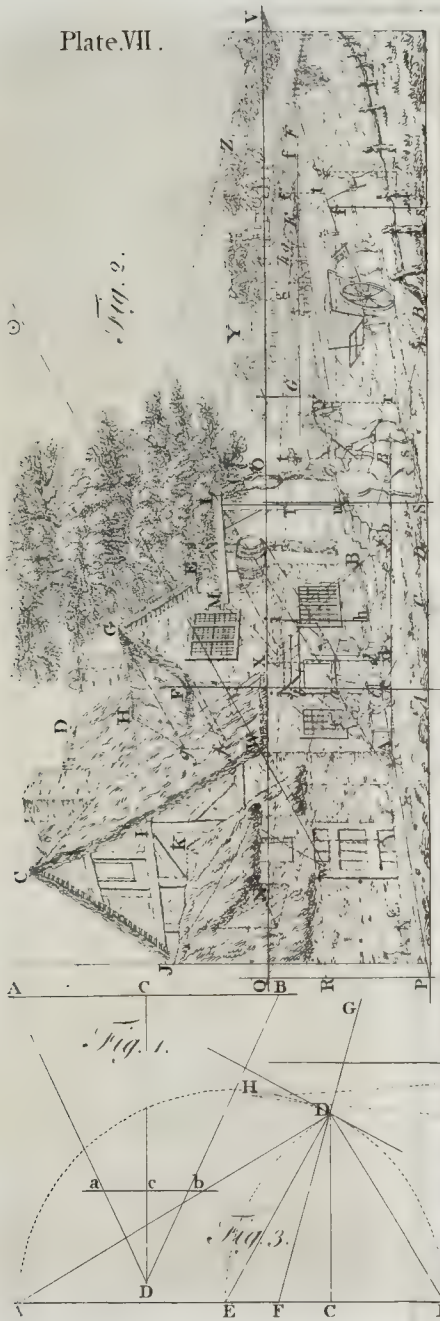
* See the ſixth Plate in the Collection of Views, by Watts.

† It is ſuppoſed, and I verily believe it, that an Artiſt will never ſhine, very conſpicuous, if he is not ſo by Nature; or (as it is ſaid) born an Artiſt. Nevertheleſs, to ſpeak my Sentiments on it, I think that Perſon, who, from a ſmall ſhare of Genius, by Nature, with ſound Judgment, and ſtrict Obſervance of her Laws, joined to an indefatigable induſtry and aſſiduity, improves the Talent Nature lent him, has more real Merit; as the other, without adhering to Rules, and due attention to Nature's Laws, is meerly Inſtinct.

‡ Of this, he has given a moſt glaring Inſtance, in the Subject I have now before me; for I affirm, and will maintain (if I have not proved it) that he never ſaw the Objects in that Picture, as he has repreſented them.

SECTION

Plate.VII.



James Mallton del.

Published by J. Mallton, May 1st 1782.

SECTION VII.

Of the Method of delineating on CURVED SURFACES; alſo, of ANAMORPHOSES, or Diſtortions.

THE delineation of Objects on curved Surfaces is a Subject which is not of great Utility, but rather a matter of Curioſity than otherwiſe, as there is, in this Country, but little occaſion for it; nevertheleſs, as it may be uſeful to ſome Artiſts, to know how to project Objects on ſuch Surfaces, I ſhall give a Specimen of the beſt method, I can conceive, of effecting it, either on arched cylindrical Roofs, or on concave ſpherical Surfaces.

In reſpect of ſuch Pictures, there is a much greater neceſſity for a fixed Point of View, than for horizontal or other plane Pictures; becauſe the effect is much worſe by a removal of the Eye from the true Point; on which I have already expatiated in Sect. 6. Art. 6. Book 2. and which, every Perſon, who has conſidered it, muſt be convinced of. Becauſe, certain Lines in the Picture, which, from the true Point of View, appear ſtreight, others properly curved, will, by ſuch removal, appear curved, others more curved, or turned the contrary way; conſequently, the whole performance, will appear diſtorted and prepoſterous; which way ſoever the Eye moves from the Point of View. For which reaſon, it is uſual and abſolutely neceſſary to diſpoſe a long vaulted Roof, or Cieling, into various Compartments, in each of which, ſhould be delineated a ſeparate and diſtinct Subject; for, to repreſent, on ſuch a Cieling, a continued Picture, from one end to the other, or beyond certain bounds, would be an abſurdity of the groſſeſt kind; much leſs, in a Dome is it poſſible to delineate the whole as one Picture, with any degree of propriety.

As circular, or irregular Surfaces, for Pictures, cannot have Vaniſhing Lines; ſo, neither can the Lines of Objects delineated on them, have Vaniſhing Points; nor can a ſtreight Ruler be applied to them, as on plane Pictures; wherefore, I can deviſe no better mode of proceeding to delineate on ſuch Surfaces, than by drawing, firſt, a Deſign of what we intend, on a Plane, according to the poſition and ſituation of the Eye, as we deſire it ſhould appear, on the curved ſurface, from that Station; and, by the moſt ſimple and facile means, project the ſame to the Surface required, whether cylindrical or domical; and which, in my opinion, can be effected no better or eaſier way, than by Reticulation, how to perform which, properly, I ſhall deſcribe. Pl. VIII

I have already deſcribed the method of drawing from real Objects, by Reticulation; which is in every reſpect the ſame, as reticulating a Picture, to copy. The Station being determined, from which, the Picture Fig. 1. is to be delineated (as at E) let AB be a portion of a cylindrical Surface, that is, a Section of it, on which, a Picture is required to be delineated, ſo, as to appear, in every reſpect, as it would, to the Eye at E, if it were drawn on a Plane, directly interpoſed before the Eye. Fig. 1.

The Picture may be drawn to any Scale, and reticulated at diſcretion.

Let Fig. 2. be the original Deſign or plane Picture, to be projected on the cylindrical Surface, ſo, as to appear, in a certain Point of View, in every reſpect, as the Original (excepting the appearance of concavity, of which it is not poſſible to be diveſted.) FG is the Vertical Line, and C the Center. AB (Fig. 1.) is ſuppoſed to be a Section of the Cieling, and E is the Point of View. Let the Picture be ſuppoſed to be placed in reſpect of the Cieling, as AD to AB; AD is equal to FG (Fig. 2.) and AC to FC; AD being ſo ſituated, that EC is perpendicular to the Picture, in its Center. Fig. 2.

Now, the only difficulty lies in reticulating the curved Surface, ſo, as to correſpond with thoſe on the plane Picture. AD being divided into equal parts, anſwering to the Squares on Fig. 2. draw Right Lines, from E, through each, a, b, &c. projecting them to the Curve, at *a*, *b*, &c. giving the true place of each on the

Pl.VIII. Curve, in reſpect of the horizontal Lines. The Center of the Picture, is projected to c, through which may be drawn the Horizontal Line; but it can be of no uſe, here, as on the plane Picture. Produce FG to H; on which, transfer all the the meaſures, A*a*, &c. projected to the Curve AB, progreſſively, at 1, 2, 3, &c.; through which, draw right Lines parallel to JF.

For, the plane Picture being parallel to the cylindrical Surface, the horizontal Lines, on the Plane, will be projected into right Lines parallel to the Horizon, but at unequal Diſtances. Becauſe, the Section of a cylindrical Surface, by Planes, parallel to its Axis, will generate right Lines; therefore a1, b2, &c. are Right Lines; and the Axis of the Cylinder is parallel to the Horizon.

The other Lines, at right angles with theſe, on the Plane, will be projected into curved Lines, all but the central or Vertical Line of the Picture, which is alſo curved, on the Surface; but the curved Surface being reduced to a Plane (as here) it is a Right Line (GH). Each of the other is more curved, the farther it is from GH; as IK, LN, &c. to draw which, accurately, is the only difficulty remaining.

As the plane Picture is ſuppoſed to be applied cloſe to the curved Surface at A; and, being parallel to the Horizon, its bottom Line coincides entirely with the Cylinder; wherefore, it generates a Right Line thereon, equal to its length.

The Viſual Ray EB is longer than EA, and paſſes through the top of the Picture; which will be projected on the cylindrical Surface, in proportion to the length of the Picture, as EB to ED, which is, here, as 6 to 5; and in the ſame manner, all the other Lines are projected, not in the ſame proportion, but all different. For inſtance; the Line NC, of the Horizon is projected, nearly, as 8 to 7 (as Ec to EC); others, as E*d* to Ed, as E*f* to Ef, &c.; and thus, by a Scale of equal Parts; adapted to the Rays, as Ea, Eb, &c. is to E*a*, E*b*, &c. the Points *a*, *b*, *c*, &c. (Fig. 3.) are obtained, ſeverally; making each Line, *a* 1, &c. in proportion to LG, as E*a* &c.; through which Points, *a*, *b*, *c*, *d*, &c. the outer Curve is deſcribed, on a Plane.

The outer Curve (LMN) being truly deſcribed, all the reſt are eaſily determined, by dividing each Line, *a*1, *b*2, &c. into the ſame number of equal parts, as LG; that is, according to the number of Squares, in the Reticulation of the Original. For it is manifeſt, that each part is ſtill in the ſame Ratio to the part of LG which anſwers to it, as E*a* to Ea &c.; and conſequently, thoſe parts are continually leſs; the Lines deſcribed through them are continually flater, or leſs curved, and at laſt terminate in a Right Line (GH) in the middle.

The outer Curve (or any other, not near the middle) may be thus projected, mechanically; which, if truly performed, will be the ſame; as at No. 2.

Draw a perpendicular Line, NO, at diſcretion, and BN perpendicular to ON, and through each point, A, b, &c. draw Lines parallel to BN.

Make PQ (on AP) equal to JF, half the width of the Picture (Fig. 2.) and draw QR parallel to PN, cuting DS at R. PQRS may be conſidered as half the origi- Picture contracted, or inclined towards the Eye; projected to PS. Draw EO parallel to BN. Then, QR being divided into the ſame number of equal parts as AD; that is, as there are Squares in the height of the Picture (Fig. 2.) through each diviſion, draw O1, O2 &c. cuting the parallel Lines from *a*, *b*, &c. at *A*, *B*, &c.; which give (from the Perpendicular, NO) the true geometrical length of each Line on the curved Surface; and being transferred, properly, to *a* 1, &c. (Fig. 3.) to which they are reſpectively equal, the Curve LMN may be deſcribed.

The Figure LNHG thus deſcribed on a Plane, and being placed on the curved Surface, ſo, that the Line LG coincides with the bottom of the Picture, and in the poſition of AD to AB (Fig. 1.) each Line, on the Original, will coincide with its correſponding Line on the curved Surface, and conſequently, each Square, with its correſponding Figure; GH is the Vertical Line, down the middle; ſo that, there is ſuppoſed to be an equal and ſimilar Figure, inverted, on the right hand.

The Lines of the Reticulation being thus projected on a Plane (on which, the Area, contained, is equal, to that part of the curved Surface of the Cieling whereon the Repreſentation is to be delineated, let the Picture be drawn according to the common method of Reticulation, with this difference, only, that, ſeveral Lines which repreſent Right Lines, on the plane Picture, muſt be curved Lines on the cylindrical

cylindrical Surface, as ab, bc, &c. to which proper regard muſt be had, or the whole performance will be a miſrepreſentation. Thoſe Lines which repreſent Perpendiculars in the Pedeſtal, and Columns, are curved after the ſame manner as the Reticulation, to which they are ſuppoſed parallel in the Original; but the oblique Lines which repreſent horizontal Lines in the original Object, muſt be carefully and judiciouſly drawn, according as thoſe Lines cut the Squares in the original Deſign.

Fig. 3. ſhews the delineation on a Plane, according to the ſpace it will occupy on the cylindrical Surface; which, being fixed thereon, ſo as to coincide with it, will, in the true Point of View, appear the ſame, in every reſpect, as the plane Picture (Fig. 2.) placed in the poſition determined above; or as it would appear before the Eye, at the ſame diſtance, in a vertical poſition. Fig. 3.

Note, the large Figure is not in proportion to this Picture, as it is obvious.

On the interior Surface of a Dome there is this difference, that the horizontal Lines, in the Reticulation, will be curved, upwards, conſiderably at the bottom, on account of the Surface receding from the edge of the Picture, in the middle; for A is projected to *A*, and *A*g is its height (Fig. 1.) which gives the Curve a b c, Fig. 3. the Baſe of the Dome being divided into eight parts, and the View taken centrally, at *E*, in *E* V. The cylindrical Cieling is ſeen better at E; but in a Dome, the Eye, being in its Axis, ſees all around, equally.

The top of the Picture is contracted, nearly to half of the width at the bottom, in proportion to the Diameter, or Radius of the Top, B 1, to g h, at the Bottom.

No. 3. ſhews the bottom of the Picture as a Chord to an eighth part of the Baſe; No. 4. ſhews the ſame at the Top. This Picture, being on the Surface of a Sphere, curved every way, cannot be reduced to a Plane, as the other.

Mr. Hamilton, in treating on this Subject, has given a very ſingular Figure, which Mr. Kirby has adopted (as it was impoſſible for him to treat the Subject better than Mr. Hamilton had done, before him) but, between them both, I cannot find out any thing they have done, to the purpoſe. I ſhould rather ſuppoſe, they meant to ſhew, how a Dome may be projected on a plane Surface, as for a horizontal Picture. Fig. 4. is the true Figure given, by them both, which is a parabolic Spheroid; on the interior Surface of which, one entire Picture is ſuppoſed to be repreſented; than which, it is ſcarce poſſible to conceive a more groſs Abſurdity.

The method propoſed, to effect it, is by deſcribing on the Surface ſeveral parallel Circles, around the Dome, at equal diſtances from each other, or otherwiſe at diſcretion; of which, a b, c d, and e f are Diameters; and drawing other Lines on the Surface, repreſenting vertical Sections, by Planes paſſing through its Axis; dividing the Circumference of the Baſe into any number of equal parts, as here into eight. Then, AB repreſenting the Section of a Plane, at the Baſe of the Dome, and D being the intended Point of View, in its Axis, at the diſtance C D from the Center of the Baſe, the Circles, in the interior Surface, will be projected into concentric Circles, and the longitudinal Lines into Radii as below, at No. 2. D*a*, D*c*, and D*e*, being drawn, cuting AB, at *a*, *c*, and *e*, give the Radius, C*a*, C*c*, and C*e*, of each Circle; the reſt is obvious. Fig. 4.

At No. 3. the Projection is ſuppoſed to be from the Point E, obliquely ſituated. E C gives the place of the Vertex of the Dome, on the Baſe; E 1, E 2, &c. give the Centers, and E b, &c. give 1 *b*, 2 *d*, and 3 *f*, for the Radius of each, reſpectively, as at No. 3. Then, by dividing each Semicircle into four equal parts, the projections of the longitudinal Lines, in the Dome, may be deſcribed, as in the Figure.

This preparation being made, and the Deſign for the Picture drawn on the plane of the Baſe, it muſt be transferred into the correſponding Compartments in the Dome; what figure it would make there, in the inſide of a Bee-Hive, let thoſe who can form a conception of it imagine; for the oblique one, particularly, it would be the moſt prepoſterous projection imaginable; and in both, the parts towards the Baſe is projected on an upright Surface, at the Vertex it is horizontal.

I ſhould not have been ſo particular in the Deſcription of this Figure, but that it may be applied to Practice, in a flat Dome, a ſmall Segment of a Sphere, of which e f may be ſuppoſed the Baſe, as at Fig. 5. on which a Picture may be delineated, with propriety; but the Point of View ſhould always be in its Axis, O G.

Pl.VIII. Fig. 5. On the left hand, it is divided into Compartments, from No. 2. a fourth part of the Base, in the same manner as Fig. 4. on the Right, it is reticulated in Squares, as at No. 3. being projected from the point of View O. The Method of projecting them is obvious from the Figure, after the description of the foregoing; by drawing Lines from O, through a, b, &c. the height each Square rises in the Dome is at *a*, *b*, &c. which are transferred by lines parallel to the Base, to the Perpendicular OG, and the Curves described as in the Figure, corresponding with the Right Lines in No. 3. Any other Point in the Curves, as e, for instance, may be obtained, by taking its distance, Ce, from the Center, and applying it from the Perpendicular CG, to *e*, which, from O, is projected to f; then a line from f, parallel to the Base, cuts Oc produced, at *E*. In the curved Surface, it will be distant from the Circumference of the Base, equal to fH. Two or three Points in each, being determined, a thin, streight Ruler, of Deal or other pliable Wood, being applied to the Surface, at those Points, will describe the Lines.

Of the ANAMORPHOSIS.

ANAMORPHOSES are generally considered as distorted Pictures, without considering them as perspective Representations; whereas, every distorted Perspective is an Anamorphosis, more or less. It is only in and near the Center, that any Object can be represented as it appears; and, the farther the Object, or the parts of an Object are represented from the Center, the more it becomes distorted; as the Tangents of the Angles, under which they are seen, become lengthened, when it exceeds 45 deg. surprizingly; so that, when the Optic Angle exceeds 90 deg. the Perspective of such Objects as are so remote from the Center, degenerate into real Anamorphoses, owing to the great encrease of the Tangents. For, if the Anamorphosis has its Point of View, in which it will appear like the Original Picture; and the Original Picture also, has its Point of View, in which it will appear like the Object; consequently then, there may be determined a situation, in which the Object may be placed, that every part shall coincide with the Anamorphosis.

Fig. 6. Let AB, Fig. 6. be a Spectator, and let CD be a Picture, whose Point of View is A, C is its Center, and AC its Distance. Now, the whole of the Representation, on the Picture, CD, is supposed to fall between D and G; then, suppose any other Plane, as BG, to pass between the Eye and the top of the Picture, cuting the Visual Rays AD, AE, &c. the parts which are represented at E and F, will be projected to *e* and *f*; which being seen, each part, under the same Angle, as the corresponding parts in the other Picture, must necessarily appear the same, to the Eye, at A; and, seeing that the Eye is in the true Point of View, for the Picture CD, in which, each part, DE, &c. is seen under the same Angle as the Original, it will appear as the Original; and so, consequently, will the Picture BG, the Point of View for which is A, and Center B; the Pictures being at right angles, with each other, the Radials, AB and AC, are consequently perpendicular to each other. It is the same thing if the original Picture, by a less Scale, in proportion as Bd to BG, was placed at d, parallel to the other, as cd to CD; for all the parts, in one, has an equal ratio to the corresponding parts in the other, each being seen under the same Angle.

Fig. 7. In Fig. 7. suppose a Globe to be projected on any given Plane, as BD, from the Point of View A. Draw the Tangents Ab, and Ad, which, last, produce to D; then is bD the representative of bd, a Diameter of the apparent Circle, whose Center is projected to C; so that, bC represents the Radius bc, and CD the other, which is nearly four times the former, bC. To determine the Conjugate Axis of the Ellipsis which represents the Sphere (of which, bD is the Transverse) bisect bD at G, and draw AG; from the Center of the Sphere, c, draw ce perpendicular to AG; then, as fg is a Diameter of the Segment of the Sphere, which is projected to G, draw GH perpendicular to AG, and having made eh equal to eg, draw Ah, and produce it, to H, giving GH for half, or FH for the whole Conjugate Axis of the Ellipsis projected by the Sphere. EI may be considered as another Picture, cuting the same Cone of Rays; on which the Sphere is also projected, at *bd*; *c* represents the Center of the Sphere, on that Picture.

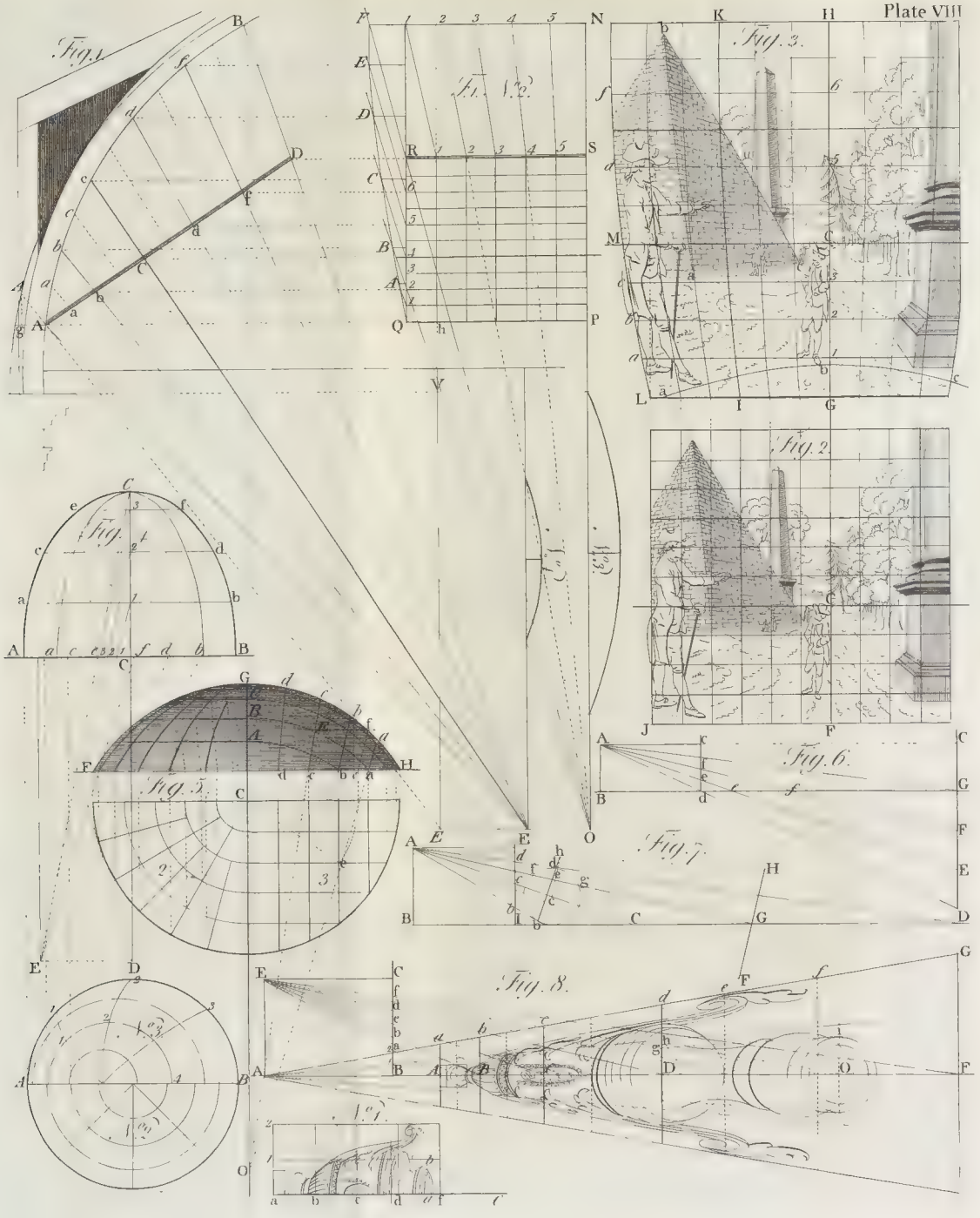


Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.

To draw an Anamorphoſis of any given Picture is, to project the Figure from a Plane, in any given poſition, to any other, as follows.

At Fig. 8. No. 1. is given a Vaſe, in Perſpective, which is required to be projected from an upright, to a horizontal or inclined Poſition. Fig. 8.

Let the given Picture be reticulated at diſcretion, in Squares or other Rectangles. Draw AF, indefinite, and AE perpendicular, at whatever height you pleaſe, for on that depends the Diſtortion, which is greater as the Diſtance is leſs; which I have heretofore obſerved is the ſole cauſe of Diſtortion, in Perſpective. At the proper diſtance (AB) let the Picture be ſuppoſed to ſtand upright; its Center being at C, the Eye muſt neceſſarily be oppoſite to it, ſo that the height of the Eye is regulated accordingly; or the Picture muſt be raiſed or lowered, as the Eye is. Theſe Preliminaries being ſettled, the chief buſineſs is to reticulate the Anamorphoſis, which is effected thus.

On BC ſet up all the meaſures on a*C*, No. 1. by any Scale, at diſcretion; as here, aC is about a third part of a*C*. Now *C* being the Center of the Picture for the Vaſe, at No. 1. conſequently, C, repreſenting it, muſt be oppoſite to the Eye, at E, and diſtant from it in the ſame proportion, viz. a third part of the Diſtance for which the Vaſe is drawn; then, drawing Lines, from E, through all the Points, a, b, &c. cuting AF at *A*, *B*, *C*, D, and F, and through thoſe Points, draw Lines perpendicular to BF. Make the Diviſions B1, 12 a third part of the Diviſions, a1, 12, No. 1. through which, from A, draw Lines cuting the former at *a*, *b*, *c*, &c. by which the Reticulation is completed; or, as AB is a third part of AD, the Diviſions on D*d* being made equal to thoſe at No. 1. it will be more accurate. Being thus reticulated, the Vaſe muſt be drawn in the diſtorted form as at Fig. 8. each part, according as they fall on the correſponding Squares, at No. 1. For greater accuracy, the Squares are divided, by dotted Lines in half, the upper one, being moſt diſtorted, is in three equal parts, which are projected as the former, from BC.

It muſt be obſerved, that, as the bottom of the Vaſe is projected beyond B, from a, which anſwers to a, No. 1. the Projection is accordingly larger, but perfectly ſimilar to what it would be, if a and B coincide, although the Eye would be leſs elevated; for it is manifeſt, that the Pyramid of Rays, AEF, being cut by any Plane, parallel to BF, they will be cut in the ſame ratio. So that, the Diſtance, EC, remaining the ſame, it is immaterial whether the Eye, and the Picture with it, be raiſed or depreſſed, till a falls below B, the projection will ſtill be ſimilar; for, although I have obſerved, above, that as the diſtance (AE) of the Eye is leſs, the Diſtortion is greater; that reſpects the Object only, which is ſuppoſed to be on the other ſide of the Picture, and ſeen very obliquely through it; conſequently, the nearer the Eye is to the Plane, the more oblique the Object is ſeen through. But, a Picture being drawn, truly, in Perſpective, of any Object whatever, the Eye being in the true point of View for the Picture, and the Anamorphoſis, or diſtorted Picture, being at right Angles with it, muſt neceſſarily be the ſame however it be raiſed or depreſſed, i. e. ſimilar, differing only in proportion. It may alſo be obſerved, that a Picture being placed at BC, a Figure of any kind, or other Object (no regard being had to Perſpective) the Picture remaining fixed, the Diſtortion in the Anamorphoſis will be leſs or greater, as the Eye is raiſed or depreſſed, the Diſtance of the Picture remaining the ſame. Or the place of the Eye remaining, in reſpect of the original Picture; if the Plane of the Anamorphoſes be inclined towards the Picture, and the Eye, the Diſtortion is leſs, but if it recline, i. e. making the acute Angle on the other ſide, the Diſtortion will be greater; and more ſo as the Inclination is greater.

In general, and as this is projected, it is neither more nor leſs than a horizontal Picture, in Perſpective, being viewed very obliquely, which is manifeſt; for, as the Object is ſuppoſed perpendicular to the Plane of Projection every circumſtance attending one, is a conſequence of the other. For, the Eye being at E, a Perpendicular, EA, from the Eye to the Plane, determines its Center; conſequently, it is the Vaniſhing Point of the Axis of the Vaſe (O*A*) and of all Lines parallel to it, as of the ſhort Lines in the Plinth. Alſo, being parallel to the top of the Vaſe, and

Plate IX. to the plane of every Circle on the Body, &c. they are conſequently all projected into Circles; as in all ſuch Caſes, the Perſpective Figure is ſimilar to the Original (Cor. 5. Theo. 9.) The top of the Vaſe may be ſuppoſed in the Plane of Projection, and O its Center; which may be thus projected, from the Picture.

The meaſures on D*d*, I have obſerved are the ſame as in No. 1. then, take the width (*ab*) of the top of the Vaſe, from the Picture (No. 1.) and apply it from D to g; draw Ag, indefinite; make Dh equal to d*a*, No. 1. and draw Eh cuting AF at O; through O draw a Line parallel to D*d*, cuting Ag produced at i, giving Oi for Radius, of the Circle of the Top. After the ſame manner, any of the other Circles on the Body of the Vaſe may be projected, applying the meaſures from the Picture, No. 1. to D*d*; either diverging from, or converging towards A.

Thus, I preſume, I have conſidered the Subject, and placed this kind of Projection in a very different Light from the generality of thoſe who have treated it, and clearly proved it to be a perſpective Projection, in every reſpect.

SECTION VIII.

Of the perſpective projection of a SPHERE, or GLOBE; of INVERSE PERSPECTIVE, or the reduction of certain Figures, perſpectively delineated, to their geometrical form and proportion; and of REFLECTIONS, on poliſhed plane Surfaces.

IF there be any imperfection, I mean deficiency, in the Treatiſe I have written, and preſumed to call compleat, it is reſpecting the projection of a Globe, in Perſpective; owing, I imagine, to my conſidering it, at that time, as not neceſſary to the Artiſt, in general; nor am I much altered in that opinion now. But, conſidering it as the firſt and moſt ſimple of all round Solids, it may be looked on by others as a deficiency; and therefore, I mean to ſupply the Defect, in this Section of the Appendix. In the 3rd Theorem, Sect. 5, of the ſecond Book, I have given a full, yet brief Theory of its perſpective Conſtruction, but have not applied it to Practice; it would, with propriety, have been introduced in the eighth Section of the third Book, but is no reaſon that it ſhould be in the eighth of the Appendix.

In the eighth Example of Brook Taylor's firſt Eſſay is one of the moſt elegant Problems I have ever ſeen, on the Subject; which is, to determine, from any Radius of a Sphere perſpectively given, with its Vaniſhing Point, the Ellipſis or perſpective Figure, which is the true Repreſentation of the boundary Outline, or Contour of its apparent Surface; the Center and Diſtance of the Picture being alſo given.

Fig. 9. AB is the Radius given, C is the Center of the Picture, CE its Diſtance, and P, the Vaniſhing Point of AB; the Center of the Sphere is B.

Draw CS perpendicular to AP, and produce it to O; making SO equal to RS, the Hypothenuſe of a right angled Triangle (RCS) whoſe Baſe, CR, is equal to the Diſtance of the Picture. Draw OP; alſo, draw OA and OB, indefinite; then, draw any Line, as ab, parallel to OP, cuting OA and OB, produced, and, with the Radius ab, on b, deſcribe a Circle; draw O*F* and O*G*, Tangents to the Circle, cuting PA, produced, at F and G, which is a Diameter of the Ellipſis. Then, find the Vaniſhing Line (HI) of a Plane, to which, all Lines, whoſe Vaniſhing Point is B, are perpendicular (Prob. 3. Sect. 12. B. 3.) thus; draw EB, and ED making a Right Angle (BED) and cuting a Line drawn through B and C (the Centers of the Sphere and Picture) at D; HI being drawn, through D, perpendicular to BD, is the Vaniſhing Line required. Find the Repreſentation of a Circle, in a Plane whoſe Vaniſhing Line is HI, and FG the repreſentation of a Diameter, found (Prob. 2. Sect. 8. B. 3.) which will be the Contour of the Sphere.

OPERATION. Produce FG to the Vaniſhing Line, cuting it at H, its Vaniſhing Point; make DI equal to DE, the Diſtance of the Vaniſhing Line; alſo, make HL equal to the Diſtance of the Vaniſhing Point H, by making DK equal to DE and drawing HK, the Diſtance required; HL muſt be equal to HK.

Being

Being thus prepared, draw cd parallel to HI, through the Center (B) of the Repreſentation; then, draw FL and LG cuting it, cd is the repreſentation of a Diameter, parallel to the Picture, which is biſected at B, the Center.

Draw IB, indefinite; alſo, draw Ic and dI, cuting CB produced, at e and f; and, having made IM equal to IK, draw CM and Md cuting IB, produced, at g and h. The Points c, e, h, d, f, and g, are all in the Periphery of an Ellipſis, alſo F and G; through all which the Curve muſt be deſcribed.

cd, ef, and gh, repreſent Diameters of a Circle, and ef is the tranſverſe Axis of the Ellipſis, its Repreſentation, in the required Plane. The Conjugate Axis will biſect ef, parallel to cd; i. e. perpendicular to ef.

If the Sphere be large, as many Points as are required may be found in the Ellipſis, for greater accuracy in deſcribing it, by Prob. 10. Sect. 4. B. 3.

Demonstration of the Proceſs. Imagine the Triangle CED turned up, on CD, perpendicular to the Picture, or CRS, on CS; alſo, let FOH be turned over, on FH, till O coincides with E, or R (the Point of View) and the Circle *FEG*, being in the ſame Plane, may be ſuppoſed turned with it, into its true place, on the other ſide of the Picture; being conſidered as a large Circle of the Sphere, conſequently O*F* and O*G* are Viſual Rays, to the extremes of its apparent Diameter, *FG*, which cut the Picture in F and G, giving FG for the repreſentation of that Diameter, the Line in which the Triangle *FOG* cuts the Picture; conſequently, OH being parallel to *FG*, H is its Vaniſhing Point, and OP being parallel to ab, and being all in the ſame Plane, P is the Vaniſhing Point of AB. Wherefore, a Plane paſſing through ED and OH (O and H coinciding, at the Eye) will be parallel to *FG*; that is, to the Plane of the apparent Circle, the Baſe of the Optic Cone of Rays, or of a Segment of the Sphere, made by a Plane paſſing through *FG*; and therefore, HI is the Vaniſhing Line of that Circle, and conſequently, the Ellipſis cedf is its repreſentation; and it is the apparent Contour of the Sphere, in Perſpective, for its whole Appearance is bounded by a Circle.

Thus I have given a brief Demonſtration, as well as a full Solution of this elegant Problem, which I flatter myſelf will be found as intereſting and entertaining to ſeveral of my Readers, as the Inveſtigation was to me. I ſhall next ſhew how it is applicable to Practice, in an eaſy and familiar manner, the ſituation of the Sphere being given, in reſpect of the Eye and the Picture. Nor do I conceive any better means to aſcertain its place, than by giving the Seat of its Center on the Picture, as it touches whatever Plane it reſts on, only in a Point, the Seat of its Center on that Plane; and its Seat on the Picture is equal to its Radius, above the Interſection of the Plane it reſts on; ſo that, either being given, the other is determinable.

Let S be the Seat, on the Picture, of the Center of a Sphere, whoſe Radius is known, and the diſtance of its Center from the Picture, whoſe Center is C; its Diſtance is known, or taken at diſcretion. Fig. 10.

Draw SC, indefinite, and CE perpendicular to SC, equal to the Diſtance of the Picture; alſo, draw SA parallel to CE, and equal to the diſtance of the Center of the Sphere from its Seat, i. e. from the Picture; draw AE cuting SC in B, the repreſentation of the Center of the Sphere. For this Proceſs, CE and SA, being parallel, may make any Angle with SC; alſo, if they are in the ratio of the Diſtances, it will be the ſame. See Prob. 6. Sect. 5. B. 3.

Through B draw *ab*, parallel to CE; make Sa equal to the Radius of the Sphere, and draw aC cuting *ab* at *a*; make B*b* equal to B*a*, *ab* is a Diameter of the Sphere, parallel to the Picture. Then, find the Vaniſhing Line of a Plane, to which, Lines vaniſhing in B are perpendicular (as above) and deſcribe the repreſentation of a Circle in that Plane, from the Diameter *ab*, found (as by cd, Fig. 9.) it will be the perſpective repreſentation of a Sphere, of the given Radius Sa, ſituated as above.

Now, DF being the Interſection of a Plane, the Sphere may be ſuppoſed to reſt on, SF, perpendicular to DF, is equal to Sa, its Radius; CD, alſo perpendicular, is the Vertical Line, and DF ſhews its ſituation on the right hand. Wherefore, if DF had been given, and F, the Point in which a Perpendicular from its Seat on that Plane, cuts the Picture (i. e. the Seat, on the Picture, of its Seat on the Plane) the

Plate IX. the Seat (S) of its Center on the Picture is determinable, from its known Radius; and consequently, the Center of the Picture (C) being the same, and its Distance, the Process is, in every respect, the same, as above described.

The Representation of a Sphere may be readily described with Compasses, in the manner following; its Seat, &c. the Center, &c. being given.

Fig. 11. Let S be the Seat of the Center of the Sphere, on the Picture, and C the Center of the Picture; the Distance is known, and the Sphere's Distance.

Draw SC, and find d, the representation of the Sphere's Center, as above; draw SA, at discretion, and make ASB a Right Angle; on the Center S, describe the Arc AB, with the known Radius of the Sphere. Draw the Ordinates aa, bb, &c. at discretion, and find their perspective representations, thus. SD being parallel to EC, make D*A*, D*B*, D*D*, &c. respectively equal to Sa, &c. and draw *A*E, *B*E, &c. cuting SC at *a*, *b*, *c*, &c. from all which, draw Lines parallel to SB; draw ad, be, and cf parallel to AS, and, from d, e, and f, draw Lines to C, cuting *a*1, *b*2, &c. in the perspective measures of the Ordinates aa, &c. Then, with the several Radii, *do*, *a*1, *b*2, &c. describe Circles, and over their Circumferences an Ellipsis may be described, which will be the representative Contour of a Sphere, whose Radius is equal SB, and the Distance of the Center of the Shpere, from the Picture, eqnal SD.

FG is the Representation of the Axis of the Sphere, perpendicular to the Picture; and FIGH the representation of a great Circle, parallel to the Horizon. The two small ones, representing polar Circles, it may be observed, are of no use in describing the Ellipsis.

Of Inverse Perspective.

INVERSE Perspective is the Art, or Method, of reducing Figures, perspectively delineated, to their geometrical form, by means of which, the truth of the perspective Process may be discovered, or the falsity proved, and Errors detected. It is frequently of use, whilst a Person is drawing, as he may sometimes be in doubt, if the Parts be truly proportioned to each other, owing to the incompetency of the Eye, in judging of what it sees; so that, without going over the original Process, which would sometimes be disagreeable, we may by an inverse operation prove the truth or detect the error, with less trouble, and sometimes more satisfactorily. For, although we see and find that we have gone wrong, it is sometimes difficult to find where the Error lies, though the whole procedure be gone over again. Also, in drawing without Rule, finding the Parts do not harmonize; and knowing the Species of the original Figure, we can prove, if the Lines on the Picture represent such a Figure.

PROBLEM I. *The Representation of any Line, on the Picture, being divided in a known proportion, to determine its Vanishing Point; the Original being either perpendicular or inclined to the Picture.*

Fig. 12. LET A*D* be the given Line, divided into three unequal Parts, at *B* and *C*; the Ratio of two contiguous Parts (*AB* and *BC*) being known, draw AD at pleasure, and make AB to BC in that Ratio, geometrically; draw B*B*, and C*C* meeting at E, and draw EF parallel to AD, cuting A*D* produced at F, the Vanishing Point required. If all the three are known, it is the same.

But, if the Ratio of *BC* to *CD*, only, be known, proceed thus.

Through *B*, draw ad, at pleasure, and make *B*c to cd in the known proportion; draw c*C* and d*D*, as before, meeting at E, and draw EF, cuting A*D* produced, at F, as before. AE being drawn, cuting ad at a, gives a*B*, for the ratio of A*B* to *BC*, &c. as a*B* is to *B*c, &c.

If the Vanishing Point be given, and the ratio of the Parts (not being known) are required; draw AD and EF, parallel to each other, at pleasure, and from any Point (E) in EF, through *B*, *C*, and *D*, draw EB, EC, and ED, giving the ratio of the Parts, on AD, geometrically.

PROB.

PROB. II. *If any Triangle be drawn, on the Picture, and its Vaniſhing Line, the Center and Diſtance being known, to determine the ſpecies of the Triangle; or, the Species of the Triangle being known, with the Inclination of any Side, to the Interſection of the Plane of the Triangle, to determine the Center and Diſtance of the Vaniſhing Line.*

a b c is the given Triangle, in perſpective; D F is the Vaniſhing Line, and G its Center; and G O, perpendicular to D F, is its Diſtance, given or known. Fig. 13.

At diſcretion, draw d f parallel to D F; produce every Side of the Triangle to the Vaniſhing Line, cuting it at D, E, and F; and alſo to d, e, and f, in d f. Draw O D, O E, and O F; and d B, e B, and f C, reſpectively parallel to them, giving, by their Interſections, the ſpecies of the original Triangle, A B C. (See Prob. 18. Sect. 5. B. 3.) If d f be the Interſection of the Plane of the Triangle, with the Picture, A B C is its full geometrical proportion.

For, O is the place of the Eye, in the Vaniſhing Plane; wherefore O D, O E, and O F, are the Radials of B C, A B, and A C, being reſpectively parallel to them, producing their Vaniſhing Points; d, e, and f, are their Interſecting Points.

Secondly, to find the Center and Diſtance of the Vaniſhing Line.

d f being drawn, and the Sides of the Triangle produced, as before; if the inclination of the Side A C, or any other, be known, make the Angle d f C equal to it, and draw f C, indefinite; then, as the Angle A, of the Triangle, is known, at f, or at any Point in f C, make the Angle C f g equal to it, and draw e B parallel to f g, indefinite, cuting f C at A; alſo, make the Angle B A g equal to the known Angle at B, and draw d B, parallel to A g.

Now, A B C being the ſpecies of the original Triangle, in its known poſition to the Picture, draw D O, E O, and F O, parallel reſpectively to B C, A B, and A C, the Point O is aſcertained; then, O G being drawn, perpendicular to D F, the Center of the Vaniſhing Line is determined, at G, and O G, is its Diſtance.

If the poſition of the Triangle to the Interſection be not known; then, having produced the Sides of the Triangle, as before, to their Vaniſhing Points, D, E, and F, biſect D E and E F, at H and I, and draw I K and H L perpendicular to D F; make the Angle H L E equal to the Angle B of the Triangle, and I K E equal to A, and draw E K and E L; with the Radii E K and E L, and on the Centers K and L, reſpectively, deſcribe the Arks E *a* O and E *b* O, interſecting at O, the place of the Eye; then, O G, being drawn perpendicular, gives the Center and Diſtance, as before. Draw O D, O E, and O F, as before.

Then, becauſe K is the Center of the Circle E *a* O, and L of E *b* O, the Angle E O F is equal to E K I, and E O D to E L H; wherefore, a b c repreſents an Angle equal to E O D (equal B) and b a c repreſents an Angle equal to E O F, equal B A C (Prob. 4. Sect. 3. B. 3.) and conſequently, D O F is equal to the Angle d C f, the external Angle of the Triangle, which d c f, equal D c F, repreſents, the Complement of A C B to two Right Angles.

PROB. III. *Having the Repreſentation of a Parallelogram, whoſe Original Figure is known; to determine its Vaniſhing Line, Center, and Diſtance.*

Produce the Sides A B and D C, A D and B C, meeting in E and F; draw E F which is the Vaniſhing Line; then, draw the Diagonal A C, and find the Center and Diſtance, by the laſt Problem, making uſe of either Triangle A B C or A C D, and their Vaniſhing Points E, F, and G. Fig. 14.

Becauſe of the parallelism of the oppoſite Sides, they have the ſame Vaniſhing Point (Cor. Th. 3.); and being all in the ſame Plane, a Right Line paſſing through the Points, E and F, is the Vaniſhing Line.

PROB. IV. *Having the Repreſentation of a Trapezium, whoſe original Figure is known; to find its Vaniſhing Line, Center, and Diſtance.*

Fig. 14. ABCD (No. 2.) is the Trapezium. Draw the Diagonals AC and BD, interſecting at I, and find the Vaniſhing Points, E and F, of the Diagonals, by Prob. 1. the ratio of the Parts, AI, IC, BI, and ID being known; then, find the Center and Diſtance of the Vaniſhing Line EF, by the 2d. from the known ſpecies of the Triangle ABI, ABC, or any other, as it is moſt convenient.

SCHOL. If two Sides, in the Repreſentation of a Parallelogram, be parallel, there can be but one Vaniſhing Point; conſequently, the Vaniſhing Line paſſes through that Point, parallel to the Sides, which are parallel to each other. Alſo, if either Diagonal of a Trapezium, in perſpective, be divided in the geometrical Ratio; then, the Vaniſhing Line will be parallel to that Diagonal, drawn through the Vaniſhing Point of the other.

As every plane Figure may be reduced into Triangles, by the foregoing Problems, the ſpecies of any Figure being known, and the ratio of the parts of any two Sides, the Vaniſhing Line, with its Center and Diſtance, may be aſcertained; or, if they are known, the ſpecies of the Figure is determinable. But, they do not determine whether the Figure be in a Plane perpendicular or inclined to the Picture, unleſs the Center of the Picture be known; and if the Vaniſhing Line, found, paſſes through the Center of the Picture, then the Figure is in a Plane perpendicular to it; and the Center of the Picture is the Center of the Vaniſhing Line. (Theo. 4.)

PROB. V. *Having the Repreſentation of a right angled Paralelopiped; to find the Center and Diſtance of the Picture, and to determine the ſpecies of the original Figure.*

Fig. 15. Let Fig. 15. be a right angled Parallelopiped; produce all the Sides or the ſix outer Lines, BC, CD, &c. only, to their Vaniſhing Points, H, I, and K; draw the Vaniſhing Lines HI, IK, and HK, and from any two Vaniſhing Points, draw Lines perpendicular to the oppoſite Vaniſhing Line, as KL and HM, interſecting at N, the Center of the Picture. On HM, or KL, deſcribe a Semicircle, and draw NO perpendicular to KL, cuting the Arc at O; NO is the Diſtance of the Picture.
For Demonſtration of this, ſee the 5th Problem, Sect. 12. B. 3.

This laſt Problem is rather a matter of Curioſity than of real Uſe; becauſe, in all common Caſes, the Vaniſhing Line of one Face always paſſes through the Center of the Picture, and frequently two; in which Caſe, the Center is determined by their Interſection; but, unleſs the ratio of the Sides are known, the Diſtance is undeterminable. When but one Vaniſhing Line paſſes through the Center, it is alſo undeterminable, if the ratio of the Sides of that Face be not known; for, ſuppoſe the Vaniſhing Line HI, of the Face ABCD, to paſs through the Center, it is conſequently, of a Plane perpendicular to the Picture (Theo. 4.) and the Sides DE, AF, and BG, are parallel amongſt themſelves, their Originals being parallel to the Picture (as in Buildings of every kind) conſequently KL, being parallel to them, is not determined, as here. In which Caſe, if a Semicircle be deſcribed on HI, the Eye being in any Point in the Semi-circumference, the Angle BAD will ſtill appear Right; becauſe, Lines being drawn from *E*, or M, being conſidered as the Eye of a Spectator, to the Points H and I, they will be Radials of the Sides AB, AD, &c. producing their Vaniſhing Points, at a greater or leſs Diſtance, and the Angle H*E*I, or HMI, is ſtill a Right one. (Prob. 31. 3. Eu.)

I do not intend, here, to enter on the Subject of Reflections, in general, phyſically, or account for the Cauſe, having already, in the fourth Book of the Treatiſe, ſaid as much, on that Head, as was neceſſary in a Work of that kind; I only mean to be more explicit on the Laws, by which the Effect is produced, and lay down Rules, more geometrically, to effect it, particularly for the inclined Mirrour, than is done in the Work. On the Surface of Water, as a horizontal Mirrour, I think I have ſaid enough, and that is the moſt uſeful; alſo, on a vertical Mirrour, parallel to the Picture, ſomewhat more may be ſaid, to render it more practical.

In determining the reflected Images of Objects, the whole Buſineſs lies in finding the repreſentations, or reflected Images of Right Lines in all poſitions, both in reſpect of the Mirrour and of the Picture. In order to which, it muſt be obſerved, that the Image of a Point, any how ſituated before the Mrrrour, appears, by Reflection, to be juſt as much on the other ſide, as its real place is on this ſide; to effect which, on that well known Principle, I ſhall reduce it into Problems, for determining the Images of Lines, in various poſitions of the Lines, and of the Mirrour.

PROB. I. *To find the reflected Image of a Line, parallel to the reflecting Plane.*

Firſt, when the Mirrour is perpendicular to the Picture, whether it be horizontal, vertical, or inclined to the Horizon, in any Angle whatever.

Let X repreſent Water, or a horizontal Mirrour; AB is the repreſentation of a Line parallel to the Horizon, and to the Picture; to determine its reflected Image. Fig. 16.

Draw A*A*, and B*B*, perpendicular, and find the Point a or b, in which the Perpendicular cuts the Surface of the Water, or the Plane of it continued, thus.

If EG be the Interſection of the Picture, and S its Center (the Diſtance being known) let E be ſuppoſed perpendicular to the Seat (*S*) of the Point B, on the Picture, and draw ES; then, having made SH equal to the Diſtance of the Picture, to half or any other portion of it, make EG the ſame portion of the known diſtance of the Original AB, and draw GH, cuting B*B* at b, the Seat of B on the Water.

Make b*B* equal to b B, and draw *AB* parallel to AB; *AB* is the reflected Image of AB, on the Water; and a b being drawn, alſo parallel, is the Seat of AB, thereon.

Secondly; when the Line is perpendicular to the Picture, as BC.

Having found b, the Seat of B on the Mirrour, as before, and the reflected Image of B; then, becauſe BC repreſents a Line perpendicular to the Picture, its Vaniſhing Point is S; and, becauſe the reflected Image of the Line, is parallel to the Line, draw *BS*, and from the other Extreme, draw C*C* perpendicular, cuting *BS* at *C*. *BC* repreſents the reflected Image of BC, which was required, and bc is its Seat.

After the ſame manner, the reflected Image of BD, of a Line inclined to the Picture may be determined; finding the Seat, and the reflected Image of B, as above, and drawing *BD* to the ſame Vaniſhing Point. For, as the original Line is ſuppoſed to be parallel to the reflecting Surface; conſequently, its Repreſentation on the Picture, and its reflected Image, repreſent parallel Lines, and therefore they have the ſame Vaniſhing Point. (Cor. Theo. 3. B. 2.) *ABCD* is the reflected Image of the Plane ABCD, and a b c d is its Seat on the Mirrour.

On a vertical Mirrour, which is perpendicular to the Picture, there is not the leaſt difference in the Proceſs; for, as its Vaniſhing Line (J!) paſſes through S, the Center of the Picture (Theo. 4.) it muſt be obvious, that *AB* being the reflected Image of bB, on the Mirrour Y, ſo *BC* is the Image of BC, and *AC* of bC; obtained after the ſame manner, by means of the ſame Diſtance and common Center, S. *ABCD* is the reflected Image of the Plane bBCc, on the Mirrour Y, to which, its Original is ſuppoſed parallel; and *abcd* is its Seat on that Mirrour.

It muſt be evident, on the leaſt reflection, that there can be no difference, in the Proceſs, on a Mirrour which is inclined to the Horizon, being perpendicular to the Picture, ſeeing it has the ſame Center and Diſtance as the other; therefore it is not neceſſary to give a Specimen of it, for it is but turning the Paper, oblique before the Eye, and both Mirrours, X and Y, may be conſidered as being inclined to the Horizon, yet perpendicular to the Picture.

Plate IX. Second; when the Mirrour is parallel to the Picture; to find the reflected Images of Lines which are parallel to it, and consequently to the Picture.

Fig. 17. Let a b d f be a Mirrour parallel to the Picture, of which, C is the Center.

Let AB be the representation of a Line, in the same horizontal Plane with ab, the bottom of the Mirrour; its reflected Image is required.

Draw AC and BC, cuting ab, and giving ab for the Seat of AB; make a *a* represent a measure equal to what A a does, by drawing B V, through a; then draw b V, cuting AC at *a*, and draw *ab* parallel to AB, which is its reflected Image.

Let EF be another Line, above the Horizon, whose reflected Image is required.

The distance of EF from the Mirrour being known, make F h equal to it, and draw EC and FC; CS being equal to the Distance of the Picture draw hS, cuting FC at f, and draw e f parallel to EF, its Seat on the Mirrour. Then draw hC, cuting fe, produced, at *b*; draw *b*S cuting FC at *f*, and *ef* parallel to EF, its reflected Image on the Mirrour.

After the same manner may be determined the Image *fg* of FG, or *eg* of EG, being all parallel to the Picture; wherefore, *efg* is the Image of the Plane EFG, being parallel to the Mirrour, and e f g is its Seat.

In the former Case, the Mirrour being perpendicular to the Picture, the distance of the Object from its Seat being ascertained, the distance of the Image, reflected, is made equal to it, geometrically; because the projecting Rays, are parallel to the Picture; but, in this Case, the projecting Rays recede from the Picture; and consequently, the distance of the original Line from its Seat on the reflecting Plane, and the apparent distance of its reflected Image on the other side, being equal, they must be made perspectively so, as it has been done.

Third; when the reflecting Mirrour is inclined to the Picture.

Fig. 18. Let Z be a Mirrour inclined to the Picture, in the Angle CDE, given; and let AB be a Line parallel to it, in a Plane which is perpendicular to the Mirrour, whose Ieterfection with it is aD. C is the Center, and CE the Distance of the Picture; wherefore, making DEV a Right Angle, V is the Vanishing Point of Lines which are perpendicular to the Mirrour.

Draw AV and BV, cuting the common Interfection aD, in a and b; make a *a* represent a measure equal to what A a represents, and draw *a*D cuting BV at *b*; *ab* is the reflected Image of AB. After the same manner *fg*, the Image of FG, is determined; first determining its Seat, f g, on the Mirrour, whose distance from the Mirrour is known.

The Image of the perpendicular Line HI is determined after the same manner, by drawing H V, cuting aD in h, and making h*b* and hH represent equal measures; then, because HI is parallel to the Picture as well as to the Mirrour, I V being drawn, and *bi*, parallel to HI, is its reflected Image; also hi, parallel to both is the Seat on the Mirrour.

KL is a Line inclined to the Picture and to the Horizon, its Vanishing Point is M. K being in the same Plane with AB (otherwise its elevation must be known, and its Seat on that Plane) draw K V, giving the Seat (k) and determine *k*, the Image of K, on the Mirrour; draw *k*M cuting L V at *l*; then is *kl* the reflected Image of K L on the Mirrour Z; and k l, tending to M, is its Seat.

Because the Mirrour is vertical, and D is the Vanishing Point of a Line in it, DM, being perpendicular to the Horizon, is the Vanishing Line; consequently, the Original of K L was parallel to the Mirrour.

In a Mirrour which is inclined to the Horizon, as well as to the Picture, there is not the least difference, save that, the Vertical Line of the Mirrour is not the Horizontal Line; but, if D, the Vanishing Point of Lines which are perpendicular to its Interfection with the Picture, be known or found (whether it be above or below the Horizon) DC is its Vertical Line; and, being produced, V, the Vanishing Point of Lines perpendicular to the Mirrour, is determined as in this Figure; the rest, as above.

PROB. II. *To determine the Images of Lines, perpendicular to the Mirrour.*

This is already done, in all the foregoing Examples; for, in the Mirrours X and Y, perpendicular to the Picture, b*B*, in one, and *b*B, in the other, are the reflected Images of the Lines Bb, and B*b*, reſpectively. In the parallel Mirrour, a b d f, A a, E e, &c. repreſent Lines perpendicular to that Mirrour; the Images of which, are a*a*, e*e*, &c. reſpectively, being perſpectively equal to them; and ſo are a*a*, f*f*, i*i*, &c. on the inclined Mirrour Z, being the reflected Images of the Lines Aa, Ff, Ii, &c. which repreſent Perpendiculars to that Mirrour.

Various Specimens of theſe may be found in the 48th Plate of the Work; firſt, for the horizontal Mirrour, Fig. 52. the horizontal Lines of the Buildings which are reflected in the Water, the edges of the Wharfs, H I, of the Bridge, &c. have their reflected Images either parallel to them, or they tend to the ſame Vaniſhing Point; and the Images of perpendicular Lines are equal to their Originals, from the Point where they cut the Surface of the Water, produced if neceſſary.

On the vertical Mirrour, W, which is parallel to the Picture, the reflected Images (*a*b and c*d*) of the feet of the Chair, (A B and C D) being parallel to the Mirrour, are parallel to their Originals, and to the Picture. Alſo, B C being parallel to the Mirrour Z, but not to the Picture, its Image (bc) has the ſame Vaniſhing Point, V. Here are no perpendicular Lines to either Mirrour; but a*a* in both, alſo b*b*, c*c*, &c. in the latter, are the Images of Aa, Bb, &c. which repreſent Lines perpendicular to the Mirrours.

PROB. III. *To find the reflected Images of Lines inclined to the Mirrour.*

Firſt, when the Mirrour is perpendicular to the Picture. Fig. 16.

Let FG be the repreſentation of a Line inclined to the Mirrour, whoſe Vaniſhing Point is V; the Horizontal Line is H V, and S the Center of the Picture.

Find f, the Seat of the Point F, on the Mirrour X; draw V H, perpendicular; H is the Vaniſhing Point of the Seat of FG, on the Mirrour. Draw H f, and produce it, indefinite; alſo, produce G F, cuting it at e; then is e the Point in which G F, being produced, would cut the Mirrour. Produce V H; make H*V* equal to H V, and draw e*V*, cuting Perpendiculars from F and G, in *F* and *G*; then is *FG* the reflected Image of FG.

This is exemplified in the inclined Line, I K, of the Bridge, of the Crane, the inclined Piles, &c. in the Water; in Plate 48, Fig. 52.

On the vertical Mirrour, Y, to determine the reflected Image of FG.

Produce FG, till it cuts that Mirrour, at *e*, which is determined thus.

g f, its Seat on the horizontal Plane X, being produced, cuts d S, the Interſection of the Mirrour with the Plane X, at d; draw d*e* perpendicular, cuting G F produced in *e*. I S, the Vertical Line of the Picture, is the Vaniſhing Line of the Mirrour Y; draw V I perpendicular to it, and produce it, making I*V* equal to I V; *V* is the Vaniſhing Point of the reflected Image of F G, on Y. Draw e*V*, and F*F*, G*G*, parallel to V I, cuting it at *F* and *G*; *FG* is the Image ſought.

Second; when the reflecting Mirrour is parallel to the Picture.

Let A B be the repreſentation of a Line, inclined to the Mirrour, whoſe Inter- Fig. 19.
ſection is a b, parallel to the Horizon, F*F*; E is its Vaniſhing Point; it is ſuppoſed to cut a horizontal Plane at B; the Extreme A is towards the Picture.

Draw E F, perpendicular, cuting the Horizontal Line at F, the Vaniſhing Point of its Seat on the Plane X; draw F B, and produce it, cuting a Perpendicular from A at D; B D is its Seat. Make C*F* equal to C F; and draw *FE* perpendicular, and equal to E F; *E* is the Vaniſhing Point of the reflected Image of A B, and *F* of its Seat. Then, from a, where the Seat, D B, cut the Interſection of the Mirrour (a b) draw a*F*, and B C cuting it at *B*, the Image of B; draw *BE* and A C

Plate IX. Fig. 19. cuting it at *A*; then is *AB* the reflected Image of AB. Laſtly, draw DC, or *AD* perpendicular, cuting a *F* at *D*; *BD* is the reflected Image of BD, the Seat of AB; which may be conſidered as a Line inclined to the Mirrour, in a Plane which is perpendicular to it.

If the Line AB inclined the contrary way, ſo that, its Vaniſhing Point was above the Horizon, the Vaniſhing Point of the Image would be juſt as much below it, and the whole Figure reverſed; but in the Proceſs, the very ſame.

If the Line does not cut the Ground Plane, its Seat muſt be determined; or any other horizontal Plane, paſſing through B, cuting the Mirrour, may be uſed, inſtead of the Plane X, after the ſame manner.

cd is a Line inclined to the Mirrour, in a horizontal Plane, above the Horizon, which cuts the Mirrour in eg; f is its Vaniſhing Point; and, C*f*, being made equal to Cf, gives the Vaniſhing Point of its Image, *cd*.

This Caſe (and as well in BD, below) is particularly exemplified in the Rails of the Chair, BC, EC, &c. reflected on the Mirrour W; Fig. 53. Plate 48.

Third; when the Mirrour is inclined to the Picture, and to the Horizon.

Fig. 20. Let AB be the given Line, in a horizontal Plane, whoſe Vaniſhing Point is V; C is the Center of the Picture, GD is the Interſection of the Mirrour, with the Plane the Line AB is in, and GH its Interſection with the Picture.

Draw CE perpendicular, equal to the Diſtance of the Picture, and draw DE; make DEF a Right Angle, F is the Vaniſhing Point of Lines perpendicular to GD. Then, becauſe D is the Vaniſhing Point of a Line in the Mirrour, and GH its Interſection with the Picture, JI, drawn through D, par. to GH, is the Vaniſhing Line of the Mirrour. (Theo. 2. B. 2.) Through C, draw KL, perpendicular to JI, and find L, the Vaniſhing Point of Lines perpendicular to the Mirrour; a Right Line drawn through F, perpendicular to the Horizon, will alſo paſs through L; for it is the Vaniſhing Line of vertical Planes inclined to the Picture, in the Angle CED, equal EFC. Make F*E*, in the Horizontal Line, equal to FE, and draw *E*L; make the Angle L*E*M equal L*E*F, and M will be the Vaniſhing Point of reflected Lines, on the Ground Plane, perpendicular to GD. Draw AF and AL, alſo BF and BL; and, from the Points *a* and *b*, where AF and BF cut GD, draw *a*M and *b*M, cuting AL and BL at *A* and *B*; a Right Line *AB* is the reflected Image of AB.

Or, its Vaniſhing Point, *V*, may be aſcertained, thus; which is more accurate.

Having obtained L, the Vaniſhing Point of Perpendiculars to the Mirrour, and V being the Vaniſhing Point of AB, draw VL, the Vaniſhing Line of a Plane perpendicular to the Mirrour, and paſſing through AB; in which will be found the Vaniſhing Point of its reflected Image; for, the Line and its Image are both in a Plane which is perpendicular to the Mirrour.

Draw CO, perpendicular to LV, cuting it at N, and make NO equal to its Diſtance (equal E*E*) draw OV and OI, and make the Angle I*O*V equal to IOV; *V* is the Vaniſhing Point ſought. For, I being the Interſection of the Vaniſhing Lines, JI (of the Mirrour) and VL, it is therefore the Vaniſhing Point of the Seat of AB, on the Mirrour; which is the common Interſection of the Mirrour, and of a Plane paſſing through AB, perpendicular to it, that is, A*AB*B; and, becauſe the reflected Image appears to be as far behind the Mirrour, as the Line, or Object, is before it, on this ſide; therefore, the Angle I*O*V was made equal to IOV, on the contrary ſide of I, the Vaniſhing Point of the Seat of AB.

Produce BA, to the Interſection GD; draw G*V*, and AL, BL cuting it at *A* and *B*; alſo draw GI, cuting AL and BL at a and b; ab is the Seat of AB on the Mirrour, and *AB* its reflected Image, as before.

Again. Let PB be a Line inclined to the Horizon, as well as to the Mirrour and Picture, and let AB be its indefinite Seat, on any Plane perpendicular to the Picture. From any Point in BP draw a Perpendicular, PQ, cuting AB at Q; draw

draw PL and QL; and through q, where QL cut GD, draw a Line from the Point of Interſection of the Vaniſhing Line of the Mirrour (JI) and of a vertical Plane paſſing through PQ, perpendicular to the Mirrour (which paſſes through F, perpendicular to the Horizon) cuting PL at p; pq is the Seat of PQ on the Mirrour, and bp of BP; make p*P* repreſent a meaſure equal to the diſtance of P from the Mirrour, that is, to what Pp repreſents, and draw *PB* the reflected Image of PB.

Or the Vaniſhing Point of *PQ* may be determined; having made F*E* equal to FE, and drawn a Line from *E* to the Vaniſhing Point of its Seat on the Mirrour, as above; as *E*R, tending to it. Draw *E* J perpendicular, that is parallel to PQ, its Radial (being parallel to the Picture); make the Angle R*E*S equal R*E* J; *E*S will cut the vertical Vaniſhing Line paſſing through M, L, and F, in the Vaniſhing Point of *PQ*. If QP be produced, and qp, its Seat on the Mirrour, meeting at T (the Point in which QP cuts the Mirrour) *QP* tends to the ſame Point. Then, drawing GT, and producing BP cuting it, at U, the Point in which it cuts the Mirrour, *BP*, its Image, and bp, its Seat on the Mirrour, tend to the ſame Point; for, GT is the Interſection of the plane Triangle BPQ with the Mirrour, and conſequently, the reflected Image of each Line, BP, BQ, and QP, tend to the ſame Point, in GT.

In Fig. 21, the Mirrour inclines to the Horizon on the other ſide; that is, it reclines from the Eye, as, in the former, it inclines towards the Eye. Fig. 21.

It is unneceſſary to be minute, in deſcribing the Proceſs, in this Caſe, which is but the reverſe of the former; excepting that, in this, the Vaniſhing Point of the inclined Line (AB) given, at V, is made uſe of, to determine its Image on the Mirrour; and, it inclines to the Horizon the contrary way, or reclines from the Picture, and does not, immediately, cut the Plane Z.

C is the Center of the Picture, and GD the Interſection of the Mirrour with a horizontal Plane; or of any Plane perpendicular to the Picture, of which, FH is the Vaniſhing Line. JI, the Vaniſhing Line of the Mirrour, being given, its Interſection with the Picture is not neceſſary; KL, paſſing through C, perpendicular to JI, cuts FM (perpendicular to FH) in the Vaniſhing Point of Lines perpendicular to the Mirrour, as before (F being the Vaniſhing Point of Lines perpendicular to GD); and, F*E* being made equal to FE, the Angle L*E* M, equal L*E* F, determines the Vaniſhing Point of the reflected Images of the Lines, Pa, &c. perpendicular to GD. The ſame Letters of Reference indicate the remaining Proceſs, as by the laſt Figure; I ſhall here ſhew how it is effected by means of the Vaniſhing Point, only, which is the moſt accurate, moſt conciſe and maſterly.

V being the Vaniſhing Point of AB, the given Line, and L of Lines perpendicular to the Mirrour, VL, being drawn, is the Vaniſhing Line of a Plane perpendicular to the Mirrour, paſſing through AB. Find its Center, N, and Diſtance, NO (CE being the Diſtance of the Picture) drawing CO perpendicular to VL (Theo. 7.); then, O being the place of the Eye, in that Plane, draw OV and OR, and make the Angle ROV equal ROV; *V* is the Vaniſhing Point of the reflected Image of AB, as R is of its Seat on the Mirrour; being the interſecting Point of the Vaniſhing Line of the Mirrour with VL, as above (Cor. 2. Theo. 6.) I is the Vaniſhing Point of the Seat of PQ, on the Mirrour, and *H* of its reflected Image, in the Vaniſhing Line HL, which anſwers to VL in the former Caſe; V being the Vaniſhing Point of the Seat (QB) of the inclined Line, as here PQ is the Seat, and H the Vaniſhing Point.

GT is the Interſection of the Plane PABQ with the Mirrour, T being determined as in the former Caſe; AP, being produced, cuts it at S, and BA at U; *D* is its Interſection with the Plane Z, the reſt is obvious.

I have now, I think, made ample amends for the brevity I had uſed in treating this Subject, in the Work, which I own I had not, then, conſidered ſufficiently; indeed, I have gone to a much greater length than I intended, here, but finding the Subject ſo very intereſting, I was unwilling to leave it imperfect; and have, therefore,

therefore, taken in all the variety of Caſes and poſitions of Lines to the Mirrour, and of the Mirrour to the Picture; to dwell longer on it would be to protract it unneceſſarily, as there cannot poſſibly be conceived a Circumſtance, wherein the Lines, which deſcribe the Object, do not fall within ſome of the Caſes I have given. And, although I am far from imagining, that any Perſon will be at the trouble of projecting the reflected Image of every Object by thoſe Rules, yet I think it neceſſary that they ſhould be underſtood, as it would prevent many groſs abſurdities which are daily practiced, by Artiſts, in this part of their Studies.

SECTION IX.

Containing a PARALLEL of the ENGLISH AUTHORS, on PERSPECTIVE; with Remarks on W. J.'s GRAVESANDE, F.R.S. who was Cotemporary with ſome of them, publiſhed in the beginning of this Century; alſo, on GUIDUS UBALDUS.

IN this Section, I have propoſed to draw a Parallel of all the Engliſh Authors who have wrote on Perſpective; but, having already exceeded the Bounds I had preſcribed, as an Appendix, I am obliged to abridge it, and omit the greater number, having nothing in them either intereſting or worthy of notice; and therefore, hope my Readers will be ſatisfied with my Remarks on thoſe, only, who have been and are ſtill in repute; as my Criticiſms on a Work, but little known, or its Author, could not be very entertaining; unleſs it tended to bring an Author, who had been hitherto unknown, into Reputation, which is not likely to be the caſe. However, I ſhall be candid in my Remarks on thoſe I do take into conſideration; to be otherwiſe I am not diſpoſed, 'tis not my Inclination; I ſhall be as ready to point out their Excellencies, as to expoſe their Errors, and ſhew their Defects; Humanity dictates the former, what the latter is hard to ſay. Yet ſurely, a candid Diſquiſition cannot be charged with Spleen, as ſome may miſconſtrue it, unleſs the Author was living, and there was ſome degree of rivalſhip between the Author and the Critic, which, I preſume there is not; neither can it be attributed to Envy, unleſs he either really excelled, or was reputed to do ſo, in his Works. Let others attribute it to what motive they pleaſe; there may perhaps be ſome Vanity gratified in it. I have ſpent much time and ſtudy on the Subject, and think I have acquired a kind of right to detect Errors in it, wherever I find them; as the falſe Opinions advanced by thoſe who are in Repute, are the more dangerous, and being once imbibed are not eaſily eraſed, where there is not ſtrength of Judgment to perceive the Error. Therefore I mean, by a ſtrict Scrutiny, to bring each Production to a fair trial, before the impartial Public, and preſume I ſhall be juſtified in ſo doing, although ſome favourite Author ſhould loſe part of the Reputation he had undeſervedly been held in.

In the firſt Section, I have given my Sentiments on all the old Authors on Perſpective, which had fallen within my cognizance; but, ſince it was printed off, another, of ſuperior merit, to ſome of them, was put into my hands; by GUIDUS UBALDUS, a folio Work, in Latin, in ſix Books or Chapters, publiſhed in the Year 1600; which, for that early period, is an extraordinary Production; where it was printed is uncertain, but, the Diagrams (all cut in Wood) are ſo badly deviſed, that thoſe who were not already clear in the Subject, would find ſome difficulty to inveſtigate the Propoſitions by them, and for that reaſon, chiefly, I am of opinion, the Author is but little known.

The firſt Book is moſtly theoretic, in 36 Propoſitions, which contain more general Principles than thoſe who wrote before him, or any ſince, within the laſt Century; which is evident to thoſe who can enter into the conſtruction of his

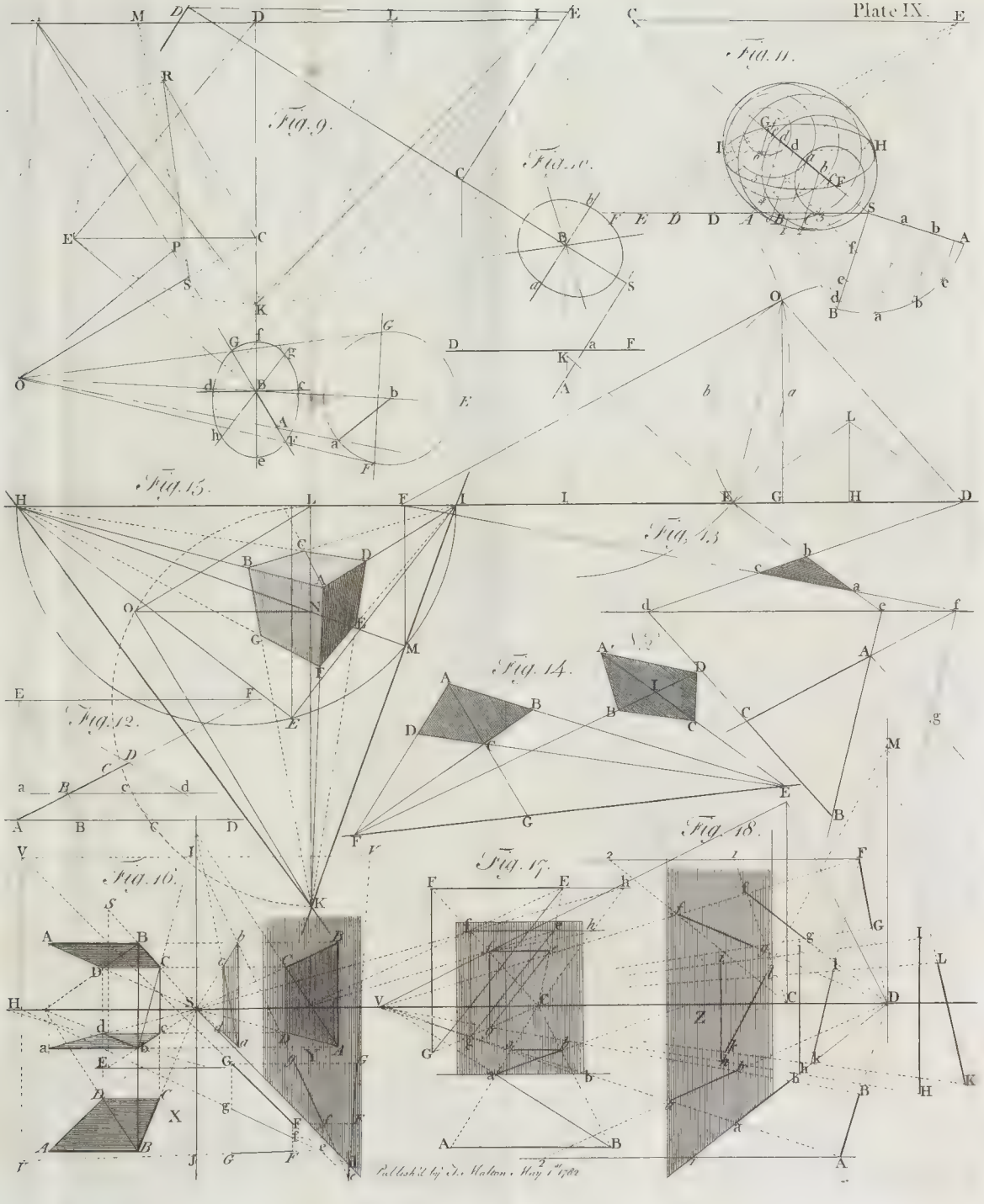


Fig. 9.
Fig. 10.
Fig. 11.
Fig. 12.
Fig. 13.
Fig. 14.
Fig. 15.
Fig. 16.
Fig. 17.
Fig. 18.
Published by J. Walton, May 1st 1782

Diagrams. After ſome preceding Propoſitions, meerly optical, he plainly ſhews, that Lines being parallel to the Picture are repreſented by parallel Lines; and have that proportion to the Originals, as the Diſtance of the Repreſentation to the Diſtance of the Original. He ſhews, that all Lines in horizontal Planes (for he does not venture beyond that) being parallel, tend to the ſame Point, on the Picture, of equal height with the Eye; and that, whether they are ſituated on this ſide, or on the other ſide of the Picture, and projected to it; whether they are at right angles with, or inclined to the Section Line; whether they are below or above the Eye, and whether they are in the ſame Plane or not. He alſo ſhews how the finite parts are determined, by Viſual Rays; alſo, that Lines from the Eye, parallel to the Originals, determine the Points on the Picture, to which they appear to tend; and make, at the Eye, the ſame Angle with each other as the Originals. Yet, he does not ſeem to have any notion of a Horizontal Line, either in the Theory or in Practice, and of placing the Diſtance of the Eye therein.

His method of Practice is ſingular, and I verily believe it is original, as I have not ſeen an attempt at the ſame Method in any other Work; I am grieved that it did not fall in my way ſooner, when I ſhould have had more leiſure, and more inclination to peruſe, and to have given a fuller account of it, in the proper place. However, as it is not now too late, I cannot paſs over ſo valuable a Work without giving a Specimen of his various Methods, and of his extraordinary Abilities; for, in the Deſcription he gives, there is an elegant ſimplicity and perſpicuity, without prolixity, of which, the following is a Specimen, in determining the Repreſentation of a given finite Line. In this Example, S is the Station Point, which he calls the Point of Diſtance; BC is the Interſection of the Picture, or Ground Line, and DE the given Line, in the Ground Plane; the height of the Eye is SA. Fig. 22.

DE is produced to the Section Line, at F, and from the Points D, E, at pleaſure, the Lines DG, EC, are drawn, parallel to each other, which agree with BC, in the Points G, C; but, from the Point S, SB is drawn, parallel to DG, EC, and SH parallel to FE; and now, imagine B, F, G, H, C, to be in the Picture, and alſo in the Ground Plane (as we ſaid alſo, in the preceding); now, let the Plane be taken for the Picture, and BV, HX are drawn perpendicular to BC, which are made equal to AS, and FX is joined, and GV, CV drawn, which cut FX in LK. Wherefore, becauſe V is the Point of concurrence of DG, EC, the Lines DG, EC will appear in GV, CV, as it was ſaid in the preceding; in like manner, when X is the concurring Point of FE, then the Line FE will appear in FX. From whence it follows, the Point D appears in L, but the Point E in K, and therefore LK will be a Line appearing in the Picture. Which indeed is manifeſt, if the Picture is conſidered in the ſame Plane with the Lines BV, HX, FX, GV, CV, perpendicular to the Ground Plane, and likewiſe, AS will be over S, perpendicular to the ſame Plane. Therefore, the Line LK is deſcribed, appearing in the Picture; which was required to be done.

This is, nearly, a literal tranſlation of the Example from the third Problem in the Second Book, which begins the Practice; which may ſerve to ſhew, how well the Author was acquainted with his Subject, and how clearly he treats it. In which, the Affinity with the preſent Method, on the new Principles, is obſervable; CB being the Interſection of the Picture with the Ground Plane; a Line, DE, is given therein, and produced to its Interſecting Point, F; and the Lines DG, EC, are drawn at pleaſure, but parallel between themſelves; then, S being the Station Point (or it may be conſidered as the Eye) SH is drawn, parallel to the given Line, and SB to EC and DG; conſequently, being raiſed up to the height of the Eye, equal SA, the Point X will be the Vaniſhing Point of the given Line, and V of the two Lines, EC and DG. Wherefore, the Indefinite repreſentation, FX, being drawn, and CV, GV, from the interſecting Points of the two other Lines, the Repreſentations of the Points D and E are in the Points K and L, of their mutual Interſections; as is evident, in the Figure.

In this Example may be clearly ſeen the true Principles of Perſpective, applied to Practice; which, excepting that Brook Taylor has both Interſection and Va-

Plate X. niſhing Line; and the given Line, with the place of the Eye, being inverted, in his Eſſay, 'tis the very ſame thing as the 2nd Problem, Fig. 7, of the firſt part, Fig. 6, of the ſecond, reſpecting the deſcribing of the Line, and determining its Vaniſhing Point; which, here, is called Point of Concurrence; but here, the given Line and the Station Point are in their true places, in reſpect of each other and of the Picture, at CB, according to Vignola and other old Authors; which is the moſt rational and eaſieſt to conceive, at firſt. In this Example, the Vaniſhing Line would not be of the laſt uſe; but when he has three Vaniſhing Points as in ſome other Examples, being of equal height, it is ſurprizing that he ſhould not draw a Line, to determine their height, above the Section Line, and yet there are ſome inſtances, in which he does draw the Vaniſhing Line, as in Prob. 35, the laſt of the ſecond Book, which, for its merit, I ſhall inſert, as follows.

Propoſition 34 is previouſly neceſſary to the 35th in theſe Words.

A given Line appearing in an upright Picture, to draw another Line, which, with the given Line, ſhall appear to a given Eye (in reſpect of place) to repreſent a certain Angle. The 35th ſays only, to find the ſame without the Object.

The Station, S, the height of the Eye, AS, the Line of Section, DE, are as before, and K is the given Angle; BC is the given Line, in the Picture, with which the Angle is required, which ſhall appear equal to K.

Fig. 23. The Line FG is drawn, parallel to DE, which is diſtant from DE according to the length of SA. And then, BC is produced, which cuts FG at F; and from the Point F, a Line, FD, is drawn, perpendicular to DE, and DS is joined. After which, the Angle DSE is made equal to the Angle K, and EG is drawn perpendicular to DE, and from the Point C, CH is drawn, which tends to G. Doubtleſs, the Angle BCH will appear equal to the Angle DSE, therefore equal to K; if indeed BC, CH repreſent Lines parallel to SD, SE, which of courſe conſtitute an Angle equal to K. Which was required to be done.

But this muſt be noted; if SE was parallel to DE, the Line CH alſo ſhould be parallel to DE. And, in like manner, if BC had been parallel to DE, then DS will be parallel to DE. And in theſe Caſes, the Example is done, runing to the other Point, only.

If any Perſon will be at the Trouble to compare this Propoſition with the 12th of the 1ſt part of Brook Taylor, he will find it the ſame thing; DSE being inverted, and DE coinciding with FG.

In this ſecond Book are no leſs than 23 different Methods of determining the repreſentation of a given Triangle, each of which has a Problem preceding the Example (more theoretic than problematic) with a theoretic Diagram to each.

Fig. 24. Fig. 24. exhibits the firſt method, viz. by means of the Vaniſhing and Interſecting Points, as by Brook Taylor. I ſhall not deſcribe the Proceſs, here, it being ſufficient to obſerve, that CED is the given Triangle, FB the Line of Section, S the Station Point, and SA the height of the Eye; which is, in general, greater than the Diſtance. The Sides of the Triangle, DC, &c. are produced to their Interſecting Points, G, H, and K, and from S is drawn SB, SF, and SO, reſpectively parallel to them; Perpendiculars being drawn from B, F, and O, equal to SA, the height of the Eye, give V, X, and Y for their reſpective Vaniſhing Points; then, drawing GV, HY, and KX, the repreſentation, LMN, is determined, on the Picture, by their Interſections.

In this ſingle Proceſs may be ſeen the whole of Brook Taylor's Principles, and as much as he has done towards determining the Repreſentations of Figures; which are always given, by him, in the geometrical Plane, reverſed; but the Proceſs is the ſame, in every reſpect, nor has he done any thing more than apply it generally. From this Author, then, it can ſcarce be doubted that the Doctor, and his Cotemporary, Graveſande, have borrowed ſome of their Ideas of the Subject, for much may be acquired from it, by thoſe who had already ſome knowledge of it, and, being able Mathematicians, it was eaſy to extend it further.

There is a great deal of Ingenuity diſplayed in the various Methods he has given; ſome of which are according to Vignola, and Sirigatti; in others, he determines

termines the Angles variouſly; in one place (Prob. 20.) by drawing Perpendiculars from each, to the Interſection, as at No. 2; in which, the Triangle is inverted, as here; then, B being the Point, where a Perpendicular from S cuts the Interſection, BD is drawn perpendicular, equal to the height of the Eye, and DE, parallel to FG, equal to the Diſtance; F*a* is made equal to FA, and G*b* equal to GC, and FD, GD drawn, which are cut by *a*E and *b*E in a and c, the repreſentations of A and C; and, the Angle B being in the Interſection, drawing aB, Bc, and ac completes the Figure.

In the 11th (No. 3.) from the Angles, A and C, of the Triangle ABC, Lines are drawn at diſcretion, as CD, CE, and SE, SF, reſpectively parallel to them; FG and EH, being drawn perpendicular, and equal to the height of the Eye, G and H are the Vaniſhing Points of CE and CD, reſpectively; alſo of Ae and Ad, being parallel to the former. Then, drawing EG and DH, alſo eG and dH, the Angles a and c are determined on the Picture, by their Interſections, at a and c.

In both theſe, it is obvious, that this Author had a clear Idea of Vaniſhing Points, which he determines geometrically, as by Brook Taylor. I ſhall give another Inſtance of his Abilities, and geometrical Knowledge, in the 25th Problem, and conclude; as I think it will be manifeſt, that they are equal to what I have ſaid of him, in the Introduction.

BCD (No. 4.) is the given Triangle, S the Station, and EF the Line of ſection. SC, SD being drawn cuting EF (as by Sirigatti) and Ec, Fd drawn perpendicular, it is manifeſt, that the Points C and D will appear, on the Picture, ſomewhere in thoſe Perpendiculars; to determine where, he proceeds thus. SA is drawn perpendicular to SD, alſo FG; and, SA being made equal to the height of the Eye, AD is drawn, giving FG, to which Fd is made equal; and conſequently, the Point d will appear at d, on the Picture; which is obvious, if the Triangle SAD be ſuppoſed turned up on SD, till SA is perpendicular to the Ground Plane; then SA is a Viſual Ray, from the Eye to D, which muſt neceſſarily cut the Picture at d, making Fd (equal FG) to SA, as FD is to SD, as he preſcribes, in the preceding, and ſhews, here, how it is effected. But, if SB had been drawn perpendicular to EF, and equal to SA; then, drawing BD, the Point d is obtained the ſame. After the ſame manner, c, the repreſentation of c is obtained, and B being in the Picture, Bc, Bd, and cd being joined completes the Figure Bcd, repreſenting BCD, according to the Premiſes given. The next differs only, in S*A* being parallel to EF.

Thus, I have given a more circumſtantial account of this Author, and his Methods of Practice, than I, at firſt, intended, reſpecting Plane Figures, in the ſecond Book; indeed I had lain it aſide, not being diſpoſed to look further into it, or to ſay any thing more of it, than the firſt general account I have given; when, on another inſpection, and peruſing ſome of the Premiſes, I perceived more merit in his methods of Practice than I had imagined; inſomuch that, I thought they deſerved to be revived, and handed down to Poſterity, in the manner I have done, a Juſtice due to the Author. To proceed further, in a Diſquiſition of the four remaining Books, I am not at all diſpoſed, nor is it neceſſary; as a judgment of the Author may be formed, ſufficiently, from what I have done.

In the third Book he treats of Solids, Parallelopipeds and other Priſms, only; the 16th Propoſition ſays, if a Pyramid be cut by a Plane, parallel to its Baſe, the Figure, in the Section, will be ſimilar to the Baſe, and alike poſited. After the 19th Propoſition, he gives a Cube, having the Vaniſhing Points of the Diagonals determined, both in the horizontal and vertical Vaniſhing Lines, the ſame as in Vignola; and he has alſo a vertical Interſection, which, by turning the Figure, ſerves as a Baſe Line. After this, he treats on inclined Planes, in nine Propoſitions, which I have not leiſure to enter into. The 29th is the very ſame as the 21ſt Method, B. 2. although he imagines it to be a quite different Caſe. 30 and 31, propoſes to deſcribe Figures on the ſeveral ſurfaces of Priſms; on cylindrical and irregular Surfaces, with other Curioſities, in the three following; the 37th is on horizontal Pictures; the remainder of this Section, to 45 Propoſitions, is for delineating on concave, conical, cylindrical, and ſpherical Surfaces.

The fourth Book treats of various kinds of Solids, fruſtrums of Pyramids, &c. their Conſtruction, their Sections, and inclination of their Faces, &c. of the regular Solids, or platonic Bodies; their orthographical Projections, Altitudes, &c. from one Angle to its oppoſite, but not of their perſpective Projections. The remainder, from the 19th to 39 Propoſitions, is on the perſpective projections of Circles and the Sphere; with the application to Arches, &c. The method he uſes for the Circle is ingenious, and nearly the ſame as Brook Taylor's firſt method.

The fifth Book, in 15 Propoſitions, is wholly on Shadows, projected on a horizontal Plane, by a luminous Point (as a Torch) at a ſhort Diſtance; of which I can ſay little, nor does it promiſe much; ſave the laſt, of a concave Hemiſphere, which is very ingenious. The ſixth Book treats wholly on Scenery, not in Propoſitions; but the Prints are vile, and promiſe little ſatisfaction to the inquiſitive Reader, ſo that there is no inducement to attempt an Inveſtigation of it.

IN the ſecond Year of this Century, 1701, a ſmall octavo Work on Perſpective, in French, by BERNARD LAMY, was printed at Paris, which is diſpoſed in ten Chapters. The firſt is rather prefatory, treating on the excellence of Perſpective, as laying the foundation of a great Painter; the ſecond defines a few common Terms, ſuch as the Geometrical Plane, the Picture, the Points of View and Diſtance, the Horizontal and Baſe Lines, Accidental Points, &c. in nine Definitions; the reſt is optical, in which is a Figure, from which, B. Taylor has copied the firſt, of his ſecond Part, but he has added the Picture. I don't mention this as tending to depreciate, as the thought is neither new nor extraordinary; another is copied by Mr. Hamilton, reſpecting Viſion, how performed by two Eyes. The third contains 12 Propoſitions in Geometry, from 11th of Euclid.

The fourth is theoretic, in 19 Theorems, in all which I do not find any thing either ſingular or ſtriking, as being eſſential in the Science; that, the Perſpective of Lines parallel to the Ground Line are parallel to the Originals; but he confines it to the Gr. Plane wholly, and makes another Theorem of perpendicular Lines; as if they were not ſubjected to the ſame Law; and that, if they are parallel to the principal Ray, conſequently perpendicular to the Picture, their Repreſentations, being produced, will paſs through the Point of View. That the Perſpective of all Lines in the geometrical Plane, not parallel to the Picture, being continued, cut the Horizontal Line; and that, being parallel, they tend to the ſame Point in it; that the Perſpective of every Figure, which is parallel to the Picture, is ſimilar to the Original Figure; that Lines parallel to the Picture, being any how divided, are in the ratio of the Originals; that the parts of Lines, which are perpendicular to the Picture (being equally divided) are unequal in Perſpective, &c. Of ſuch like, common-place, matter is the whole Theory compoſed; for illuſtration of which, the Diagrams (neatly cut in Wood) are not badly deviſed. Some few pertinent Corollaries, of the ſame ſtamp, are deduced. To the 6th Theorem (that parallel Lines, in the Ground Plane, tend to the ſame Point in the Horizontal Line) is added a Problem, to find the Accidental Point; which is, to find the Repreſentation of one Line, and produce it to the Horizon; then, all the other Lines will tend to the ſame Point. This puerile Method, ſo liable to Error, was practiced by all the old Authors; ſo that, the Point was properly called *Accidental*.

The fifth is preliminary to the Practice; of the ſituation of the Objects to be repreſented, of the poſition of the Picture, the Point of View, &c. The ſixth contains the Practice, on upright Pictures, which is not worthy of notice, ſave the firſt Figure, which is theoretic; ſhewing, that the diſtance of the Eye being ſet off on the Horizontal Line, and the diſtance of a Point in the Ground Plane, on the Ground Line, will give the ſame Point on the Picture, as a Viſual Ray from the Eye to the Point, in its true place beyond the Picture. The ſeventh is on inclined and horizontal Pictures, which are poor indeed; of Anamorphoſes, and drawing on a ſpherical concave Surface, by means of a Candle, projecting the Shadow of an Object thereon. The eighth contains Rules for colouring, as dependant on Perſpective; Clair Obſcure, &c. The ninth, general Obſervations for

for projecting Shadows, not worth notice; and the tenth is a Converſation between Socrates and Pyrrhus, and with Cliton; the firſt an excellent Painter, the other an able Sculptor.

W. J.'s GRAVESANDE, LP. D. Prof. Math. and Aſtr. at Leyden, and F. R. S. at London, publiſhed an Eſſay in 1711; which was tranſlated into Engliſh, and publiſhed by E. Stone, in 1724, dedicated to Mr. W. Kent, Architect. The Original of this Work, which was printed at the Hague, in French (as above) appeared four years before Dr. Brook Taylor publiſhed his firſt Eſſay, the Tranſlation is nine Years after. It is far from my Intention, nor have I a wiſh to leſſen the Merits of my own Countryman, Dr. Taylor; I had much rather attribute to him the ſole invention of the new Principles, could it be done with candour; but, 'tis my determination to give the praiſe due to the Author, whereever I find occaſion. In this Work it is manifeſt, that a foundation is laid for thoſe univerſal Principles, which are to be found in no Author before Brook Taylor; the Theory is conciſe, the whole being comprized in ſix Theorems (the Subſtance of which may be comprehended in three) with ten Corollaries, three or four, of which, may be diſpenſed with, as uſeleſs.

Although the Original of this Work was wrote in 1707, as we are informed in his Works, it is remarkable, that he begins his Preface with apologizing to the Public, for obtruding on them a Subject which was already ſo much hackneyed, that the very Term, Perſpective, ſeems unpleaſant to the Ears of the public Enemies of Repetition; whoſe Cenſure he deſires may be ſuſpended till he has given the reaſons which induced him to publiſh his Work. Amongſt which are the confined and limited Ideas, which the generality of Books, on the Subject, inculcate; ſome contenting themſelves with the bare explication of the Theory, without ſhewing the application of it; but that, very few have given a new turn to the practical part, in which, he believes he may be able (though he knows himſelf to be much inferior to ſeveral who have wrote on the Subject) to treat the Art after another manner; and ſo, repay with Intereſt, what he may be inferior to them, by his Diligence; and, becauſe he is perſuaded, that more learned Perſons than himſelf, will not take the trouble on them, he has ventured to expoſe his Work to the taſte of the learned World. He candidly acknowledges that he is indebted to ſome of the Authors who have diſtinguiſhed themſelves amongſt the Crowd, having looked over the beſt part of them, who have treated on the Subject. What would he think, did he live in thoſe Days, to the Numbers which this Century has already produced, in England, only? more, in my opinion, than the preceding Century, in all Europe, beſide.

In defining, he makes uſe of the ſame conſtruction of the elementary Planes, as Brook Taylor, excepting only the Directing Plane, which he has not; yet he makes frequent uſe of the Directing Line, which he calls the Geometrical Line; the Station Point, and Line, alſo, the Vertical Plane and Line, are properly defined; and indeed, there ſeems only wanting a general Idea of Vaniſhing Lines; for, Vaniſhing Points he determines, of Lines however ſituated, with propriety, yet he calls them Accidental Points, like the old Authors. In his firſt Definition, he ſays, the Perſpective, Repreſentation, and Appearance of an Object (for theſe three Terms are ſynonimous) is the Figure which the Rays form, in paſſing through the tranſparent Plane; in which it is obſervable, that he confounds the Appearance with the Repreſentation of an Object, and he makes uſe of the Terms promiſcuouſly.

The firſt and ſecond Theorem are contained in the ninth of mine, viz. that the Repreſentation of a Line which is parallel to the Picture is parallel to the Original; and has the ſame proportion to the Original, as the Diſtance of the Picture to the Diſtance of a Plane paſſing through the Line, parallel to the Picture. But, inſtead of theſe words, in the latter part, his ſecond Theorem ſays, that the Repreſentation of a Figure, parallel to the perſpective Plane, is ſimilar to the ſaid Figure; and the Sides of the ſaid Figure are, &c. as above; in which

Plate X. the ſimilarity of the Figures is firſt proved; whereas, it is obvious, if the paralleliſm and analogy of the correſponding Sides are proved, the equality of the Angles, and, conſequently, the ſimilarity of the Figures neceſſarily follow. The third Theorem follows from the ſecond; viz. that a Line, parallel to the Picture, being ſeen by two Eyes, both being in a Plane parallel to the Picture (i. e. in the Directing Plane) the repreſentations of the ſaid Line will be equal (See Cor. 3, Theo. 9.) The fourth Theorem is in theſe Words. If a Right Line, being continued, meets the perſpective Plane, *in one Point*, the *Appearance* thereof will be a part of the Line drawn from the ſaid Point in the perſpective Plane, to another Point, whereat a right Line drawn from the Eye, parallel to the propoſed Line, terminates. The ſenſe of this Theorem is manifeſtly the ſame as the 12th of mine (the firſt of the 1ſt Part, or 3d of the 2d of B. Taylor) there is indeed a redundancy of words, and the laſt (terminates) means, cuts the Picture. Three Corollaries deduced from this Theorem, are as follow; 1ſt. All Lines parallel between themſelves, &c. have Repreſentations, which being produced, will all concur in one point. And this point is called their Accidental Point (Def. 17. P. 19.) 2. Two or more parallel Lines, &c. parallel to the Geometrical Plane (i. e. the Ground Plane) have their accidental Points in the Horizontal Line. 3. The Repreſentations of all Lines, parallel to the Station Line, concur in the Point of Sight, i. e. all Lines which are perpendicular to the Picture (Cor. Theo. 4.) The fourth is vague and uſeleſs, and, as it is expreſs'd, erroneous. Theorem 5 is uſeleſs as a Theorem (See Cor. 5. Theo. 12.) The ſixth, as it ſtands in this Work, means little or nothing; but the ſubſtance of it is, that the Radials of two Lines, producing their Vaniſhing Points, make the ſame Angle at the Eye, as the original Lines make with each other. This is the whole of the Theory, in which may be perceived the Eſſence of Brook Taylor's Eſſay; there wants the moſt eſſential one, for practice (See Theo. 13.) which teaches how to proportion Lines, perſpectively drawn, indefinite, on the Picture.

In the practical part of this Work, to determine the Repreſentation of a Point, is variouſly and judiciouſly performed. He alſo ſhews, that there is no neceſſity for taking the whole Diſtance; but when it is remote, any portion of it may be uſed, taking the ſame portion of the diſtance of the original Point. He gives the Method of performing it by Tangents; alſo, by means of the Directing Line, very judiciouſly; and, by another Method peculiar to himſelf, which is very ingenious, inſomuch that I think it deſerves to be communicated.

Let IB (Fig. Z. Pl. II.) be the Baſe Line, A a given Point, and E the Eye, diſtant from the Baſe Line, or Interſection, equal to the Diſtance of the Picture, added to the height of the Eye; as in Brook Taylor, the Vaniſhing Line (HD) not being neceſſary in this Operation; C is its Center.

Through E, draw FG parallel to IB; make EF equal to the height of the Eye, and EG equal to its diſtance. Draw AE, and AF cuting IB, at B; then, draw BG, cuting AE in a, the repreſentation of A.

For proof of this Proceſs, a Conſtruction is made, by drawing GI perpendicular to IB, and EC parallel to AF; then, through C, draw HD parallel to the Baſe Line; or if HD be conſidered as the Vaniſhing Line, of whatever Plane the given Point is in, then, where it is cut by BG, (at C) draw CE, from that Point to the Eye, which will be parallel to AF.

DEM. Becauſe HC is parallel to IB, the Triangles GBI, GCH are ſimilar; wherefore, GC : GB :: GH : GI; But GE = GH, and GF = GI; conſequently, as GC : GB :: GE : GF; therefore, EC is parallel to AF, and conſequently, C is the Vaniſhing Point of AB; and EA is a Viſual Ray from the Eye to the given Point. And therefore, the Triangles AaB, EaC are ſimilar; conſequently, a is the Repreſentation of A, on the Principles of B. Taylor; for Ba : aC :: AB : EC.

SCHOL. From this Demonſtration, it is evident, that if EF and EG are in the ratio of the height and diſtance of the Eye, though not the real meaſure, the Point a will be produced the ſame. Alſo, if any other Line be drawn through E, not parallel to IB, as fg, and any Point f, or g, be taken at pleaſure; e. g. draw fb,

at

at diſcretion, cuting the Interſection, at b, and draw Ed parallel to fb; then, draw bd, and produce it to g. Or, if bg be firſt drawn, at pleaſure, cuting the Vaniſhing Line at d; then, Ed being drawn, and bf parallel to it, the Points f and g may be uſed as F and G. For, becauſe dE is parallel to bf, gd : gb :: gE : gf; and conſequently, any other Line, gB, being drawn, it will ſtill be, gC : gB :: gE : gf, as before; therefore, the Point a will be determined the ſame.

Without determining the height or diſtance of the Eye, a Line, fg, may be drawn, and three Points, f, E, and g, taken at pleaſure, by which we may proceed; and, in order to know what the height and diſtance is, draw fB and EK, perpendicular to IB, and gB being drawn, cuting EK, at C; then, C is the Center, EC the diſtance of the Picture, and CK the height of the Eye.

In this Diagram there ſeems to be the whole of the true Principles for Practice, as by Brook Taylor, which does not depend on the real meaſures being applied, but on the ratio of the parts to each other, as it is obvious here; ſo that, had this Author advanced but one Step further, and applied his Principles to Planes in all Poſitions, reſpecting the Horizon (which one would imagine, from what he has done, there could be no myſtery in) he had left very little for the other to invent. But he falls off, ſurprizingly, in the application of them to Lines and Figures, in the following Chapters. Of Lines he gives but two Examples; viz. a Line parallel and another inclined to the Baſe Line. The inclined Line is produced to its interſecting Point, and its Vaniſhing Point is determined; then, the indefinite Repreſentation is drawn, and two Viſual Rays determine the finite Part, as in Brook Taylor; but, as the Rays are drawn from the Eye, in its place, to the Line, it is frequently impracticable; yet, neither here, nor in B. Taylor, is it ſhewn how to tranſpoſe the Eye to the Vaniſhing Line, or the meaſure of the Line, to the Interſection, as in Prob. 17. Sect. V.

Here is given a method of dividing a Line into any number of parts, equal or unequal, which I do not remember to have ſeen elſewhere. and is very ingenious; the given Line is AB, and *ab* its repreſentation, any Point, as D, being aſſumed, between the original Line and the Interſection (or it may be taken beyond it) and its repreſentation *d* being determined; Lines drawn through D, from the Diviſions A, B, and C, cuting the Interſection at a, b, c, and from them Lines drawn through *d*, give the perſpective Diviſions on *ac*. Fig. Z.

He gives but three Examples of plane Figures. a Pentagon, firſt, a Rectangle, and a Circle. The Pentagon has its hither Side parallel to the Interſection; he makes uſe of but one Vaniſhing Point, although it is obvious, that another would greatly facilitate the Proceſs. The Rectangle is obliquely ſituated to the Interſection. and is divided into leſſer Rectangles; the Eye Point is above the Vaniſhing Line, from which, the Vaniſhing Points of the Sides are judiciouſly determined; and, the Lines, in the Figure, being produced to the Interſection, the perſpective Figure is effected. By means of a Rectangle thus reticulated, he ſays, any kind of Figure may be deſcribed, viz. by circumſcribing the Original Figure with a Rectangle, as in Boſſe, a puerile and trifling Method. The repreſentation of a Circle is determined by drawing ſeveral parallel Lines through it, to the Interſection, and their Vaniſhing Point, as in the firſt Method by B. Taylor; or, finding the tranſverſe and conjugate Axes of the Ellipſis which repreſents it; but it muſt be ſeen direct, ſo that the tranſverſe Axe is parallel to the Baſe Line.

To find the repreſentation of a Point, elevated above the Ground Plane, his method of proceeding is meerly mechanical, by means of the Station Point and Directing Line; this is preparatory to the repreſenting a Pyramid, and Cone. To determine the viſible part of the Baſe of a Cone is really ingenious, the reſt is trifling. After theſe, he proceeds to determine the repreſentations of Lines perpendicular to the Ground Plane, which he performs variouſly, but by round about Methods; which ſhew, that he had no Idea of uſing any other Interſection but the Baſe Line; although the laſt Figure points it out, clearly (Fig. 25.) he ſeems determined not to make a proper uſe of it, but applies the given meaſure to the Baſe Line, inſtead of a perpendicular Line, at the ſame Point; and demonſtrates, that

the perſpective height is truly found on the Ground Plane, from which it is transferred to the Perpendicular.

I ſhall paſs over the repreſentations of Priſms (in which he makes not the leaſt uſe of Vaniſhing Points, but finds the Angles in the upper Face, as points elevated above the Ground Plane) and Cylinders; but his Method of projecting a Sphere, in Perſpective, is worthy of notice; although, in the Preface, he ſays, it is very difficult, if not impoſſible, to throw a Sphere into Perſpective, by means of general Problems, and the Torus of a Column is ſtill more difficult; ſo that, he is obliged to have recourſe to particular Methods for the ſolution of them; yet the Sphere is truly projected, by means of the tranſverſe and conjugate Axes of its Repreſentation. Of the Torus he makes a perplexed affair, for which, he gives a long, algebraic Demonſtration; yet, the repreſentation given is vile, and the Method he preſcribes, for projecting it, impracticable.

For Lines inclined to the Horizon as well as to the Picture, he determines the Vaniſhing Point with great propriety, and lays down its Diſtance on a Line parallel to the Horizon, in order to proportion the indefinite Line to its perſpective length, in the moſt judicious manner; which, one would imagine, had been much eaſier applied to Lines in the Ground Plane, in the preceding Problems, where there is not the leaſt attempt at it. In reality, one would be led to imagine from the 36th Figure, that he was thoroughly acquainted with every requiſite for a general and univerſal Theory; but, in many reſpects, his Practice is deficient; and, although the Diagrams ſeem to point out the uſe of other Vaniſhing Lines, yet it does not appear that he has the leaſt notion of any but the horizontal.

Here follows a Chapter in which is nothing remarkable, containing four Problems, for finding the Repreſentations of Figures when the Diſtance of the Eye is ſuch, that its place cannot be denoted above the Horizontal Line, nor laid down thereon; or, when the Object is ſituated very oblique, ſo that the Center, or Point of Sight, is conſiderably out of the Picture; (an abſurdity for which no Expedient was neceſſary) alſo, for finding the Repreſentation, when the Picture is ſituated above the Eye, yet vertical. The ſolution, in the former Caſe, is ſuch as one might expect, from his firſt Problem; viz. by taking any portion of the Diſtance, at diſcretion; but, having found two Angles of the Figure, the reſt are determined from them; after which (Chap. 5.) he treats of the inclined Picture. This Chapter contains ſome Problems, for finding the Vaniſhing Points of Lines perpendicular, or inclined to the Ground Plane, on an inclined Picture, as elegantly conſtructed, as fully and briefly demonſtrated as any in B. Taylor; in which, the Diſtance of the Vaniſhing Point is laid down, and the Lines proportioned truly geometrical; inſomuch that, there ſeems to be nothing wanting for a perfect Theory, or, but little left for his Cotemporary to do, in order to perfect it. In the next Chapter, for horizontal Pictures, he ſeems to have loſt ſight of the Principles he has hitherto proceeded on; for, in reſpect of Lines perpendicular to the Picture, the operation, though ingenious, ſeems to have no Affinity with the foregoing, in a ſimilar Caſe; and he calls the Center, or Point of Sight, their accidental Point, as for Lines inclined, to the Picture.

Reſpecting Shadows, which are the Subject of the 7th Chapter, (the whole of which is contained in five Problems and as many Pages) this Author has done little or nothing, to any purpoſe. The 8th, is wholly mechanical, intended to ſhorten Operations in Perſpective, by means of Rulers and Threads, on the Principle of Fig. Z, Plate II. Fixing the edge of a ſtreight Ruler, by a Pin, at one end, in the Point G; then, a Thread being fixed in the Point F, which, after being put through a fine Hole, near the Point of a Needle, is carried round a Pin, fixed in E, with a ſmall Plummet to keep it tight. Then, A being a given Point to be repreſented, he puts the point of the Needle at A; the Thread ſliding freely through the Eye, and over the Pin at E, by means of the Plummet, the Thread forms the two right Lines, AF and AE; the edge of the Ruler being brought to B, where AF cuts the Baſe Line, he marks the Point in which it croſſes AE (at a) which is the repreſentation ſought; and thus every Angle of any right lined Figure may be obtained.

This is indeed a wonderful Expedient; giving all the merit due to the conſtruction of the Figure, which is really ingenious, ſeeing that there are but three Lines to be drawn, in the Proceſs, or but one (AE) a Ruler applied to A and F gives B, and again, to B and G, marking where it cuts AE, the buſineſs is effected; ſo that, it is not worth while to fix ſo much tackle to effect it.

There are more Apparatus of a ſimilar nature; one of which, on the principle of Prob. 28. Sect. 5. B. 3. on the practice of Perſpective, by means of the Directing Plane, is really ingenious; but they anſwer no uſeful purpoſe, becauſe, all that can be effected by ſuch Apparatus is, merely, to find the repreſentation of a Point, by which means, plane Figures may be repreſented; but they are as readily, and with greater accuracy performed by Rule. Solids of the ſimpleſt conſtruction could not, then, be deſcribed by them; becauſe they knew not the uſe and application of any other Geometrical Plane, but the horizontal; and, for any thing complicated or ornamental they are totally uſeleſs. The ninth, and laſt, Chapter is on the uſe of Perſpective in Dialling; after which is a Deſcription, with the Theory and Uſe of the Camera Obſcura, of which there are two different Conſtructions; all which are foreign to my Plan.

Thus, I have given a candid and impartial Account of this Eſſay, in which I have been more circumſtantial, as it far excels every antecedent Work, in reſpect of Theory and Principle; but contains no ſtriking Examples to ſet it off, yet more real knowledge of the Subject than is contained in them all.

THE firſt Engliſh Author I have met with, in any degree of Reputation, is HUMPHRY DITTON, Maſter of the New Mathematical School, Chriſt's-Hoſpital, who publiſhed a ſmall octavo Tract in the Year 1712; but one Year after Graveſande, with whom had he been acquainted, he certainly might have made a much better Work of it, being greatly inferior, yet 'tis not void of Merit; and indeed, more may be attributed to him on that account. Yet, as thoſe Gentlemen (between whom, generally, ſubſiſts a ſettled Envy) have the earlieſt intelligence of each others Productions, 'tis not improbable that he had ſeen it. HUMPH. DITTON. 1712.

Sometime ago, on a curſory ſurvey of this Tract, I conceived a much higher opinion of it, than I find, on a cloſer Inſpection, it deſerves. He ſets off on a rather extraordinary Hypotheſis, after the laſt Definition, of which there are twenty and two; ſome abſurd, ſome redundant, others pertinent, yet frequently exceptionable and partial. The firſt ſays "Perſpective is an Art which teacheth how to delineate the true *Appearances* of Objects," &c. Graveſande ſays, *Repreſentations*. The Diſtance of any Point *in the Ground Plane* (the 9th) from the Table (the *Picture*) is partial; *Direct* Parallel Lines, *Oblique* Parallels, and *Tranſverſe* Lines (in the three following) are ſuperfluous, or exceptionable, as there is no uſe in the term *Parallel*, in the two firſt; ſave that, in the firſt caſe, all *direct* Lines would be parallel; but not according to his Definition, which, he ſays, "are ſuch as cut the Ground Line at right Angles." Now, Lines may be perpendicular to the Ground Line in every direction, in Planes to which it is perpendicular. By tranſverſe Lines, he means only ſuch as are parallel to the Picture, but, partially, in the Ground Plane. The 12th is in theſe Words; "*Radial* Lines, I call all ſuch as run up from any Points in the *ground* Line, to any Perſpective *Focus*, whether the Point of Sight, or accidental Point," &c. In the firſt place, Radial Lines is an improper Term, for indefinite Repreſentations; Perſpective Focus is too general, to take in every Vaniſhing Point; as it cannot, with propriety, be applied to any but the Point of View, i. e. the Center of the Picture. In the 15th he ſays, "The *Accidental Point* is a Point which bears the ſame Relation to ſuch Parallels as are *oblique* to the Ground Line, as the *Point of Sight* does to thoſe which are *perpendicular* to it," &c. It ſhould have been Accidental Points, in the plural (that is, Vaniſhing Points) unleſs he had ſaid, of a Line; but why to thoſe *Parallels*, only, that are *oblique* to the Ground Line? what has the Ground Line to do in the Caſe? beſides, Lines perpendicular to the Ground Line, may be very oblique to the Picture, and conſequently have

Plate X. Accidental Points; but ſurely, Lines in other horizontal Planes may be inclined, as well as in the Ground Plane, in which he means to confine them, wholly, in his Definition. By point of *Incidence*, in the 17th, he means the Seat of a Point on the Picture; but ſtill on the Ground Plane, to which he is unneceſſarily partial.

The 22d defines the Optic Angle; after which, he makes this curious Remark. "According as this Angle is bigger or leſs, ſo we commonly ſuppoſe things to appear bigger or leſs to us. And it is moſt certainly true, that they do ſo, in Varieties of Caſes: But that they do ſo in *all* Caſes, is as certainly falſe," &c. In the Inſtance he brings to prove this aſſertion, I think he is by no means juſtifiable; for I can ſcarce admit it to paſs under the denomination of *Things*, for all Subſtantives are not Things; as Time, Space, Diſtance, &c. I ſhall give his own Example, as follows.

Fig. 26. Let AB be a Spectator, the Eye at A, and BD a continued level Surface; let BC be equal to AB, and ABC a Right Angle; then, BAC, ACB are each half Right; wherefore, if AD be drawn, to any diſtance in BD, conſequently, the Angle CAD is leſs than BAC, (for if AE be parallel to BD, the Angle EAC is equal to BAC) yet the Space, or Diſtance, CD appears greater than BC; but, if the Diſtance does, I preſume he will not ſay, that the Line (which is a Thing) does; I doubt not the Diſtance will appear greater, although the Angle is really leſs; but of that, the Eye is not competent, but forms a judgment from Experience, only.

The firſt Propoſition is this: "The farther Parallel Lines are produced from the Sight, the nearer they ſeem to approach to each other; provided the Eye be placed any where, between the ſaid Parallels;" and then he adds, "This is true, whether the Eye be in the ſame Plane with the Parallels, or whether it be raiſed above or depreſſed below them;" but the third is moſt extraordinary, viz. "If the Eye be ſituated any where without the Parallels, they will ſeem to go farther from each other (or the Intervals to widen) to a certain term of Diſtance; and after that, continually to approach each other." This very extraordinary Paradox he proves thus.

Fig. 27. Let AI and BK be parallel Lines, and let the Eye be ſituated at E; let FH be drawn between AI and BK, equidiſtant from and parallel to them; draw EF perpendicular to FH, and on F, radius EF, deſcribe an Arc, ECD, cuting the Parallels; alſo, take any Point, as G, on both ſides F, on each of which, with the Radius EG, deſcribe the Arks EAB, EIK. Then, becauſe the Centers are all in the Right Line FH; AB, CD, and IK will be equal Chords, in unequal Circles; wherefore, if EA, EB, EC, &c. be drawn, ſeeing that E is in each Arc, and ECD has the leaſt Radius (EF) conſequently, the Angle CED is greater than AEB or IEK, which (if FG, on one ſide, be equal to FG on the other) are equal; and therefore, the Lines AI and BK, appear wider aſunder at CD, and converge both ways, towards AB and IK.

It is obſervable, that, to the firſt Propoſition, he ſays, this is true, &c. as above; and here, the Premiſes are, if the Eye be ſeated without the Parallels, &c. But he does not ſeem to conſider, that, the Eye being in the ſame Plane with them, they appear but one Line, in the latter Caſe particularly, ſo that there can be no Idea of Parallelism in the Caſe; and in the former, although they are two diſtinct Lines, being produced, they appear to approach directly towards each other; and would, being continued, appear to fall into and conſtitute one Right Line. But however, it is certain, that if the Eye (in the latter Caſe) was raiſed ſomewhat out of the Plane, the Effect would be nearly the ſame; and is indeed a ſingular Circumſtance, that the Lines, being parallel, ſhould appear wider aſunder where they are farther diſtant from the Eye. But this can only be the Caſe when the Eye is very near the Plane the Lines are in, and not poſſible to take into the Optic Angle any portion of them, being extended on the other ſide EF.

The fourth is trifling and puerile; viz. "All Planes above the Eye ſeem to ſink the more downwards, the further they are produced: Thoſe that are below the Eye ſeem to riſe upwards; thoſe on the right hand to approach to the left, and thoſe

thoſe on the left to the right." I am at a loſs to know what is propoſed in this; H. Ditton.
'tis obvious, to ſight, that it is ſo, and needs not a formal Demonſtration. Here are deduced from it no leſs than ten Corollaries, as trivial and childiſh as the Source they are derived from; particularly the ſecond, which is moſt unaccountable; it is too long to inſert, but the ſubſtance is, that, for the reaſons in the Propoſition, in Churches, e. g. the Pavement from the Door, towards the Altar, need not be raiſed, in reality; becauſe, as there is an Aſcent, from the Principles of Optics, it ought not to be made more ſo actually, for various reaſons, as abſurd as can poſſibly be conceived. The fifth is, that the Repreſentations of plane Figures, parallel to the Picture, are ſimilar to their Originals. The ſixth, that all the Conic Sections are only the perſpective Repreſentations of the Baſe. The two next mean but little. The ninth ſays, that, "The Perſpectives of all Lines which are parallel one to another, and not to the Ground Line, do run up into one and the ſame Point on the Table." After which he ſays, "This is the main and great Propoſition in this Science." It ſeems indeed, as if the greater number of Artiſts gave him full credit for it. But he ſeems to have no notion of their runing down as well as up. Perſpective is a poor Science if this be the grand Arcanum; yet it is an eſſential of it. There are no leſs than twelve Corollaries follow this Propoſition; the ſeventh propoſes a Method, for determining where Lines in the Ground Plane converge, which is, to draw a Line from the Foot, parallel to the Parallels, and, from the Point where it cuts the Ground Line, carry up a Perpendicular, equal to the height of the Eye, &c. This is perfectly as Ubaldus does, as I have ſhewn in ſeveral Inſtances; but the tenth ſays better; "If an Angle be made at the Eye, equal to the Angle under the Sides of any Polygon; the Lines containing that Angle will ſtrike (*or cut*) the Table in the Points, to which the Perſpectives of all Lines, parallel to the ſaid Sides, will converge," &c. This is well meant; but I don't find that he applies it to practice. The eleventh Propoſition is the moſt eſſential one, viz. "Any portion of a *direct* Line, contiguous to the Table, is to its whole Perſpective, as the ſum of its length, and the Eyes Diſtance from the Table, is to the length of the whole correſpondent Radial." But why of direct Lines only? are not the finite Parts of all converging Lines determined perſpectively on the ſame Principle? The twelfth, if a Line be parallel to the Ground Line, its Perſpective ſhall be parallel to it alſo; and the 13th that the Perſpectives of all Lines perpendicular to the Ground Plane will, if produced on the Table, be perpendicular to the Ground Line. But, why the Proviſo, *if produced?* what difference does that make in their Poſition? or, what need was there for two Propoſitions? ſeeing that, in both, it reſpects Lines, ſimply conſidered, parallel to the Picture, only; their Poſition, in reſpect of the Horizon, is a neceſſary Conſequence. Six unneceſſary Corollaries follow this Propoſition; becauſe they are either the ſame as in ſome preceding Caſe, or they are wholly impertinent. The three remaining Propoſitions contain nothing either uſeful or extraordinary, ſave the 15th which is very exceptionable, as it is made general, but holds true in a particular Caſe, only; viz. when the inclined Line is parallel to the Picture, as the Tranſverſe is underſtood to be.

We now proceed to the Practice, of which, I cannot but give an Inſtance of his firſt effort, with the Diagram annexed; Fig. 28. is a true Copy of it, which is the moſt prepoſterous one I ever ſaw; for which no excuſe can be alledged, for want of room, as is ſometimes the caſe. The Problem is, to find the Seat of a Point in the Perſpective Table. By a Point of Sight and Diſtance. The Eye is at A, the Point of Sight B, the Diſtance C, the given Point F; E G is the Ground Line, and C H the Horizontal. F D is drawn, perpendicular, and D E made equal to D F; then, the *Radial*, D B, cuts the *Line of Diſtance*, C E, in *f*, which is the Seat of F, as required. By Seat is meant the Repreſentation. Fig. 28.

Now, although this Proceſs is ſtrictly true, yet have I never ſeen a more abſurd Figure to illuſtrate it. Firſt, the Diſtance, A B, is exactly half the height of the Eye, i. e. of the Space between the Horizontal and Ground Line; and the obliquity of the ſituation of the point F is ſuch, that B H is more than four times the

H. Ditton. the Distance; the consequence of which is, that the Optic Angle, being twice B A H is more than 150 degrees, which is, at least, three times what it ought to be; besides, the Distance being laid down, on the other Side, at c, would determine *f* more accurately.

After this Figure follow two, taken from Guidus Ubaldus, Prop. 6. B. 2. the first method of drawing a Triangle, in Perspective; the theoretic Figure is inverted, but differs in nothing else; save the horizontal Line being drawn, in both; otherwise, the practical Diagram is a perfect Copy, in every respect, though badly devised in the Original; but he makes more application to it. In the following Diagrams, for plane Figures, are the most distorted delineations imaginable; in one of which (the 21st) the Distance is little more than a third part of the height of the Eye; by which means, the Perspective of a direct Line (F W) is almost double the Original. Now, as he gives no Rules for determining those matters, or points out the bad Consequences in making use of too short a Distance, how is it possible for any Person to acquire a right notion of them, from such Works? without great, natural Abilities, 'tis not possible.

The first Solid is a pentangular Prism, a most distorted Figure; which, by mistake in shading, exhibits a different Object, turning its opposite Faces towards us. What he has done in Solids is taken from Pozzo, particularly in the delineation of a Pedestal (Fig. 27.) a petit, trifling Figure. We are told how to delineate Pyramids, regular and irregular Solids, Cones and Cilinders, perspectively, without a Figure to refer to, or so much as an Example, how to describe a Circle, in Perspective; yet we are told, how to find the Axes of the Ellipsis which represents it. Such is the practical part of this Work, even the delineation of an Icosaedron is described without a Figure to refer to, a method I have never seen elsewhere; it is, with me, a matter of doubt, if he could have drawn the Figure he prescribes Rules for; but he prudently advises, to place it so as to be the least trouble.

Here is a lame attempt at Anamorphoses, which he makes subservient to the projection of Shadows, by the projection of a Rectangle (as it is called) on the Ground Plane; which is all that is done on either Subject. Reflection on Mirrours is somewhat better handled, yet greatly deficient and imperfect. Horizontal Perspective, as he calls it, is of a piece with the rest; if we will take his Word for it, 'tis much easier, in practice; but I find nothing done to justify the Assertion. On inclined Pictures Mr. Ditton criticizes on B. Lamy, yet without proving him to be erroneous; nor does he handle the Subject much better, rather more mathematically; for, in his last Problem, to draw the Representations of Lines perpendicular to the Horizon, on an inclined Picture (which, he says, is a difficulty) he concludes, after two Pages, talking of Points and Lines of incidence, Apices, Cosecants, and Co-tangents &c. i. e. after a trigonometrical Demonstration, of nothing (for he never refers to a Figure but once, to a Line B o) with, "After this, I believe there cannot be any difficulty remaining, to the Practice on inclined Pictures." Three Problems follow, on Inverse Perspective; with an Appendix, containing nothing material.

On the subject of inclined Pictures, particularly, may be perceived the narrowness of such contracted Principles, as in this Work, compared with Brook Taylor's; which are quite general, and regard not the position of the Picture to the Horizon. The Center of the Picture is where a Perpendicular, from the Eye, cuts it; but here, he calls the Point, in which Lines in the Ground Plane, perpendicular to the Intersection, or Ground Line, converge, the Point of Sight, as in upright Pictures. Schol. P. 135. says, "All the difference is, that the Line C B is, there, perpendicular to the Table, and here oblique; which necessarily arises from the different position of the Table, in this Case; but, in both, it is parallel to the Horizon, and where it strikes the Table determines the Point of Sight." Such are the Notions here inculcated; which, with the Errors in referring to the Figures, want of Letters, sometimes Lines, and the irregular disposition of the Figures, in the Plates (which occasion much trouble and loss of time) and being badly devised, render it, altogether, a poor performance.

IN 1715, the WORLD was favoured with the first Production of this able Mathematician, in this branch of Science; to which, all future Publications on the Subject (save Ware's Sirigatti, and Ferguson's) are indebted; in reality, respecting the Principles and Theory, they all may be deemed Comments, of which; Dr. Taylor's is the original Text. This Work is a meer Pamphlet, in octavo, of 42 Pages, entituled, "Linear Perspective, or a new method of representing, justly, all manner of Objects, as they appear to the Eye, in all Situations." Here it is necessary, in the first place, to remark on a capital Error, in the Title Page; of which he is sensible in his second Essay. Dr. BROOK TAYLOR. 1715.

It appears, from this Title Page, that the design of Perspective, is to represent Objects as they *appear to the Eye*; a Circumstance which has misled many, in their notions of Perspective; so that, when they are informed it is not so, they impute it to some fallacy or imperfection in Perspective; which I have vindicated from such Aspersions, and made clear, to Demonstration, in the 6th Sect. B. I. of my Treatise. I look on it, in this place, as an oversight, not as an Error as Judgment; for it does not seem probable, that a Person of his Knowledge in Optics could be so far mistaken.

In his Preface, or Address to the Reader, he says, "In this Treatise I have endeavoured to render the Art of Perspective more general, and more easy than has yet been done. In order to this, I find it necessary to lay aside the common Terms of Art, which have hitherto been used, such as Horizontal Line, Points of Distance, &c. and to use new ones of my own; such as seem to be more significant of the Things they express, and more agreeable to the general Notions I have formed to myself of the Subject." In this he has shewn great Judgment, for those Terms have really cramped the Ideas of Artists, in general, so that, some can never acquire a clear notion of the Subject, on general Principles, as they are laid down by this Author.

Although I have said that I cannot attribute the Error in the Title to an Error in Judgment, yet it is clear that he had not properly considered, that the Representation of an Object, in Perspective, is not the true Appearance of it, as is manifest from the first Paragraph, in Sect. I; where he says, that, "Perspective is the Art of drawing, an a Plane, the *Appearances* of any Figures, by the Rules of Geometry." This is manifestly a Definition of Perspective, but a very erroneous one; of which he must have been sensible, had it appeared in its proper light; for he certainly knew, that a Globe appears round, however situated; but if (as it cannot be doubted) he had any knowledge in Conic Sections, he must also know, that the perspective Representation of a Globe is always one or other of them; and, that its most general Representation is an Ellipsis, yet always appears round. Now, if a Globe, situated obliquely, in respect of the Picture and the Eye, be represented as it appears, that is, round, and also of the same apparent magnitude, in respect of another, in the Center of the Picture; then, the Eye being in the true Point of View, it is manifest, that the one seen oblique would neither appear round, nor of the magnitude intended. For, the Doctor says, in the next Paragraph, that, "to produce the proper Effect, the Light ought to come from the Picture to the Spectators Eye, with the same Colour, strength of Light and Shadow, and in the same *Direction*, as it would do from the corresponding Points of the real Object, as if it were placed where it is imagined, *(or rather where it appears)* to be;" which could not be the Case, being represented as it appears; because, one of its Diameters being seen direct, must subtend a larger Angle than that which is at right angles with it, being seen oblique; therefore, it cannot appear round, as the Object does, seeing its Diameters appear unequal. It is easy to prove that it would also appear less than the Object, at the distance it is seen; but, as a Diagram is requisite, I must refer the Reader to Fig. 33. Plate 7, of the Treatise; Sect. 6. Art. 3. B. II. Page 93.

In this Tract he gives but ten Definitions; from some of them he deduces Corollaries, with great propriety, which are valuable Lessons to the Delineator. The Point of Sight is omitted; the Center of the Picture corresponds with what was

Dr. Brook Taylor.

formerly ſo called. His firſt Theorem is, that "the Repreſentation of a Line is part of a Line paſſing through the Interſecting and Vaniſhing Point of the Original Line." He deduces from it, firſt, this Corollary; that Lines which are parallel amongſt themſelves, but not to the Picture, have the ſame Vaniſhing Point; but not without the aſſiſtance of his Definition of a Vaniſhing Point: But, that the two following are deducible from thoſe Premiſes, I cannot acquieſce in; the firſt of which is, that "if the original Lines are parallel to the Picture, and to each other, their Repreſentations will be parallel to each other and to the Originals;" but, if this be granted, the next will eaſily follow; viz. "that the Repreſentations of plane Figures, parallel to the Picture, are exactly of the ſame ſhape as their Originals;" it is rather an unſcientific expreſſion, for a Mathematician. He has no more than four Theorems, and one of them is of very little conſequence. viz. that the Repreſentation of a Line is parallel to a Line paſſing through its Directing Point and the Eye; becauſe the applying it, in practice, is neither convenient nor expeditious; nor, in many caſes, practicable, for ſeveral reaſons.

I ſhall paſs ſlightly over the problematical part of this Eſſay (having given the whole Subſtance of it in the Work) which, in twelve Problems, contains almoſt the whole Elements of Practice, reſpecting right lined Figures, and plane Solids. The Diagrams might have been better adapted, and 'tis pity he had not beſtowed more care in reviſing the Preſs; for, although ſo ſmall a Tract, there are many falſe References; and the whole might be better digeſted.

In Example 3, Fig. 21, we are referred to Prop. 15, for the Operation, yet 'tis very differently performed; and, though founded on the ſame geometrical Principles, I am of opinion, that the affinity between them is but ſeldom ſeen. But what makes it ſtill worſe, is the negligent manner in which it is done; for, inſtead of the Angle being biſected, as we are told, it is divided in the ratio of 2 to 5, as near as may be. The next is, in reſpect of its geometrical Principles, a very elegant Problem; but, the Diagram is ſo ill conſtructed, as to render it prepoſterous. It is, to draw the Repreſentation of a Circle, through three Points given, perſpectively, in the Circumference. In order to bring it within compaſs of the Plate, the Diſtance of the Picture is taken about two fifths of the height of the Eye; ſo that, if the Circle was compleated, being very large, in proportion to the Diſtance, and lying almoſt wholly on one ſide of the Center, it is drag'd out ſo very oblique, as to make it appear extremely diſtorted. However, the Principles are the ſame; and, although he only ſhews how to get another Point, (and that, not in the moſt eligible manner) it is ſufficient, to one converſant with the Properties of Circles. (See Prob. 11. Sect. 4. B. 3.)

Example 6, Fig. 24, would (had the Figure been well proportioned) have been, at that time, a fine one. It is a Flight of four Steps; but the Steps being, in height, not a fourth part of their width, and, being inclined, the Lines come ſo very cloſe together, that the Diagonal, by which they ſhould be determined, is not diſtinguiſhable, the Angle being ſo ſmall. The Picture is inclined, as is uſual, in order to render his Principles general, ſo, that the Center falls on the ſecond Step; for it is the ſame whether the Picture or the Steps incline; but, as the Center of the Picture is conſiderably below the Vaniſhing Line of the horizontal Face of the Steps, which he calls the Vaniſhing Line of the Plane of the Horizon, it certainly implies that the Picture is inclined. This is the firſt, and I think the only time he ever uſes that Term. The next Example is of a regular Tetraedon, the proceſs of which, from a Side given, he deſcribes very concifely; but the Diagram is very ill conſtructed. It contains three Tetraedons; one ſhews three Faces, another two, and the third (ſhewing but one Face) is ſo diſtorted, that the whole is an unpleaſing Figure. The Center is given, but very injudiciouſly; and (as well in the laſt Example as this) we are told, that the Diſtance is equal to the Line L, which is not to be found.

After this Example, he ſays, the Reader may exerciſe himſelf, in drawing the Repreſentations of the five regular Solids, and proceeds to ſhew how their Plans and Profiles may be drawn, geometrically, without attempting to deſcribe them

perſpectively; therefore, they had been as well omitted, wholly, as they had nothing to do in a Book on Perſpective; and, although Highmore (after Mr. Hamilton) has treated them, at large, I cannot think much of their utility; or that they, in any wiſe, render the common Rules of Perſpective more facile. The eighth, and the laſt Example, is indeed a curious one, and truly worthy of its Author; but, like the Platonic Bodies, it is of little uſe, which made me overlook, and omit it in the Treatiſe. However, as I have, ſince then, conſidered it more maturely, I thought it worthy of a place in this Appendix; it is, to find the Repreſentation of a Sphere, having one Radius perſpectively given, and its Vaniſhing Point; which, with a practical Example deduced from it, I have given in the preceding Section. (See Figure 9 and 10, Plate 9.) Dr. Brook Taylor.

The Principles, given, for projecting Shadows (Sect. III.) contained in three Problems and one Example, are too limited, and very obſcure; which, I am of opinion, have never been turned to much account. The laſt Problem, though clear in the Premiſes, is illuſtrated (or intended) by a Diagram which, I muſt own, I cannot comprehend, being the moſt uncouth and perplexing Scheme I ever ſaw; indeed, his Diagrams, for Shadows, &c. are all trivial. As this Problem is, frequently, neceſſary, in projecting Shadows, and alſo, in finding the reflected Images of Objects, on plane Mirrours, I ſhall give it, as follows.

The Center and Diſtance of the Picture being given, and the Vaniſhing Lines of two Planes, with the Repreſentation of their common Interſection; alſo, the Repreſentation of a Line, and of its Seat on one Plane; it is required to find the Repreſentation of its Seat on the other Plane.

In reſpect of Planes which are at right angles with each other, this is already done, in Fig. 16. Pl. 9. where the Seat of the inclined Line FG, is determined on a horizontal and on a vertical Plane; I ſhall therefore give an Example which is more general, in which the Planes are inclined to each other, as well as to the Horizon. In Fig. 29. AB is a given Line, whoſe indefinite Seat is DF, on a Plane whoſe Vaniſhing Line is GH; the Center of the Picture is S, Diſtance SO; it is required to find the Seat of AB on another Plane, whoſe Vaniſhing Line is GI; the common Interſection of the two Planes is FG. Fig. 29.

Find K and L, the Vaniſhing Points of Lines perpendicular to each Plane, whoſe Vaniſhing Lines are GH and GI; draw KL, which being produced, cuts the Vaniſhing Lines at H and I, the Vaniſhing Points of Lines perpendicular to FG, in each Plane. The Seat of a Line on any Plane, being obtained by Perpendiculars to the Plane, therefore draw AK and BK, cuting DF, at D and E; conſequently, AL and BL repreſent perpendiculars to the other Plane; then, becauſe H and I are the Vaniſhing Points of Lines perpendicular to FG, draw DH and EH cuting it at d and e, and laſtly, draw Id and Ie, cuting AL and BL at *D* and *E*; *DE* being drawn is the Seat of AB on the other Plane.

DE, being produced, cuts FG at F, and AB cuts DF at C, the Point where it cuts the Plane; if FI be drawn, AB produced cuts it at M, which is where it would cut the other Plane; and conſequently, *DE* tends to the ſame Point.

If the Vaniſhing Line GI had paſſed through K, the two Planes would be at right angles; but, as it falls without, the Angle is obtuſe towards the Picture. At No. 2. GI falls within K. and therefore the Angle is acute towards the Eye, and the given Line, AB, inclines the contrary way, or reclines from the Picture; and conſequently, it cuts the other Plane above, at M, the Point to which its Seat, *DE*, muſt tend, as before.

In theſe Diagrams, FG, the common Interſection of the two Planes, falls between the two Vaniſhing Lines, which is the moſt rational, but, Dr. Taylor gives it without; and the poſition given, of the Seat of the Line, is ſuch as renders it abſurd, and to me, wholly unintelligible; becauſe I think it is irreconcilable. The fourth Section, on Reflections, is very conciſe, comprized in three Pages, and as many Problems; two of which, illuſtrated by Fig. 39, contain the Eſſence, yet are far ſhort of what is neceſſary, to make it clearly underſtood. The fifth,

and

Dr. Brook Taylor.

and laſt Section, on Inverſe Perſpective, is not much more copious, but is fuller on the Subject, and contains all that is eſſential in it. This ſmall Tract has nothing in the Plates to embelliſh and ſet it off; here is no ornament, to pleaſe the Eye; nothing but ſimple geometrical Diagrams, which are by no means ſtriking, in eighteen octavo Plates; but they contain more general Principles, and (to thoſe who have taken the trouble to inveſtigate them) inculcate more real knowledge of Perſpective than all that had, before, been publiſhed on the Subject. The 10th Plate, and Fig. 27. in the ninth, are of no uſe in the Work, as they contain the geometrical conſtruction, only, of the three laſt regular Solids.

IN the Year 1719 he publiſhed another Tract, not a ſecond Edition of the former, but a diſtinct and ſeparate Work, in 70 octavo Pages, with a copious Preface (the former having little more than one Page); I could wiſh to tranſcribe the greateſt part of it, 'tis ſo very pertinent. He begins with "Conſidering how few and how ſimple the Principles are, on which the whole art of Perſpective depends.—I have often wondered that it is ſtill in ſo low a degree of Perfection." And, ſo long after he has publiſhed thoſe ſimple Principles, and ſo many, ſome voluminous, Comments on it have been ſince publiſhed, were he now living, he would find more cauſe for Wonder; that he is, at this time, ſo little underſtood, by thoſe, to whom it is more eſſentially neceſſary. "Some Books, on the Subject, he ſays, are very voluminous, but they are made ſo by a tedious explanation of common things, or by a great number of Examples, and a great variety of curious Cuts; which indeed make ſome of them valuable; but they convey no Inſtruction, or Improvement in the Art." Here he has an Eye on Pozzo, and ſpeaks juſtly of it; for I know no other, exiſting then, to which it can be applied, ſave the ſecond and third Parts, of the Jeſuit's, reſpecting *curious* Cuts, the other are fine. "In this Book I have done my utmoſt to render the Principles of the Art as general, and as univerſal as may be;" and he has ſucceeded in it, for it is not poſſible they can be made more general.

The objections which, he finds, have been made to his firſt Eſſay induced him to publiſh the ſecond, in which he has made the Schemes more ornamental; which prove, evidently, the great advantage his Principles have, over the common Rules, by abridging the Proceſs, and diveſting it of a vaſt confuſion of Lines; yet, that is ſtill, and ever will be, a grand Objection, which deters many from the Study of it; being too indolent to beſtow much pains, and not having a fund of Geometry, ſufficient for the inveſtigation of his Principles; for want of which, they cannot perceive their excellence, nor feel a true reliſh for them. "Perſpective (he ſays) is more particularly neceſſary to the Art of Painting; a Figure not truly drawn does not repreſent what is intended; ſo that a Picture, which is faulty in that particular, is more blameable than a Compoſition in writing that is deficient in Grammar; yet how many fine Pictures, highly valuable in other reſpects, are entirely faulty in this. Indeed it is ſo very general, that I do not remember ever having ſeen a Picture entirely without it; and what is more to be lamented, the greateſt Maſters have been the moſt guilty of it, whoſe Examples make it leſs regarded, but the more to be lamented, and requires more Care to prevent it in future." The grand Cauſe, he attributes to the wrong Method taken in their Inſtruction; for which, he would recommend it to the Maſters, to begin their Inſtructions with the technical Parts (that is, the geometrical) before they are let looſe to follow the dictates of their uncultivated Imaginations; in which he is certainly right; for, having no judgment of their own, nor Rules to correct their rude Sketches, which are the reſult of a ſpontaneous and luxuriant Fancy, they are hurried into the greateſt Abſurdities; owing to their not having a right conception of the difference between the appearance of the real Object and its Repreſentation on a plane Surface.

Nothing (ſays he) ought to be more familiar to a Painter than Perſpective; for it is the only thing that can correct the Judgment, and aſſiſt the Invention. The inventive Part is common with Poetry, volatile and undigeſted; of which, the Picture is but a Copy, of the Deſign formed in the Imagination. The executive Part is wholly confined, and ſhould be tied ſtrictly to the Rules of Art, which cannot,

on any account, be diſpenſed with; by which, the Artiſt ought to govern himſelf, and regulate his Deſigns, and not to take any liberties whatſoever; for what is perfectly agreeable and juſt in the original Object, can never appear defective in a Picture, on which thoſe Objects are exactly copied. He ſhould have added, when the ſituation of the Object, the diſtance and poſition of the Picture are judiciouſly choſen; of which, many of his own Examples are glaring Inſtances to the contrary. An Object, being well proportioned in all its parts, can never appear diſtorted, nor offend the Eye in any Point of view; but being delineated on a Plane, without due regard to its ſituation, to the Eye and to the Picture (though truly deſcribed, by the infallible Rules of Perſpective) may nevertheleſs appear extremely diſtorted and prepoſterous, when viewed direct; as in Fig. 8. Plate 8. which (though an Anamorphoſis) is a regular Perſpective of a well proportioned Vaſe; and, being ſeen in the true Point of View, exhibits a true appearance of the original Object. Dr. Brook Taylor.

In the firſt Definition of this ſecond Part, he has corrected the Error of the former, and ſays, that Perſpective is the Art of deſcribing the *Repreſentations* of Objects (in the other it is *Appearances*) on a plane Surface.

We have, here, nineteen Definitions, not diſpoſed in the moſt regular order; chiefly the ſame, in ſubſtance, as the other, with ſome additional ones, particularly the Point of Sight, the only eſſential one. He does not deduce Corollaries from them, as before, but enlarges, and new models his Theory, which is preceded by four Axioms and a Lemma. The firſt is this, that a Line drawn from the Center of the Picture to the Center of a Vaniſhing Line is perpendicular to the Vaniſhing Line. This, I have made the 7th of the 2d, the 8th of the 1ſt Impreſſion; having, previous to it, given a full Theory of Vaniſhing Lines, their Affections, and Poſitions in reſpect of other Lines, and, in ſome Caſes, of each other; the ſecond is not eſſential; the third is the 12th of mine; the fourth is the ninth of the 2d; the tenth of the 1ſt Impreſſion; for, I look on the parallel poſition of Lines to be the ſimpleſt; 'tis certainly the eaſieſt in practice, to a young Student, and for that reaſon ought to be firſt-diſcuſſed; the fifth, that the Repreſentation of a Line is parallel to its Director, as it is not of much conſequence, in practice, I have made the laſt. The ſixth, that the Vaniſhing Line, &c. is parallel to the Interſecting Line, being the firſt property of Vaniſhing Lines, neceſſary to be inculcated, I have made it the 2d of the 2d, the 3d of the 1ſt Impreſſion. The 7th and 8th are in the 10th of the 2d, the 9th of the 1ſt Impreſſion; for, being almoſt ſelf evident, and either being underſtood the other is deducible, it was not neceſſary to make two Theorems of what might be comprized in one.

He has reduced, here, the moſt eſſential one, in Practice (the fourth of the firſt Part; the 13th of mine) which determines the Ratio of the ſeveral parts of Lines, divided perſpectively, which are not parallel to the Picture, to a Corollary, from the ſixth. Nor has he, any where, a moſt neceſſary one (the 11th of mine) for determining Vaniſhing Points; which demonſtrates, that the Radial of a Line, producing its Vaniſhing Point, makes the ſame Angle with the Vaniſhing Line, as the Original Line makes with the Interſection. Here are ſeveral Corollaries deduced, which I have made diſtinct Theorems; for they do not appear, to me, deducible from thoſe Premiſes; as that above, ſimply, from the Parallelism of the Vaniſhing Line and Interſection, &c.

The problematical part of this Eſſay is illuſtrated with ſomewhat more ſtriking Figures; the firſt Elements differ very little, but he has extended the Principles more, to inclined Pictures, and Planes in general, in the 14th and three following Problems; but the Application of it, in the 18th is meerly deſcriptive; for, in the following Example, in projecting the Dodecaedron, I think he ſwerves from his own Principles; the Excellence of which conſiſts, chiefly, in determining the perſpective Repreſentations of Objects, by means of the Vaniſhing Lines and Points, of their ſeveral Faces and Sides, and not, as here, by a perſpective Plan and Elevation; which, though not repugnant to his Principles, have a near Affinity to the Method uſed by Pozzo, and other old Authors. In this Eſſay, he has given two Methods for deſcribing a Circle perſpectively; but neither of them is practicable,

Dr. Brook Taylor.

when the Diſtance is conſiderable; and there are much readier, or more practical Methods. He has alſo given ſome Examples for projecting Shadows, and for Reflections on Water, and Mirrours, of which there are none in the former; but he is not very explicit in either.

This Tract is not divided into Sections as the former; but here, at Page 54, he makes a ſecond Part, on Inverſe Perſpective, comprized in ſix Problems, and but five Pages; the whole of which is in the fifth Section of his firſt Eſſay. He concludes this Work with an Appendix, deſcribing a Method, for projecting or curved, or irregular Surfaces, by means of a Torch, which is to little purpoſe. After which, is propoſed a Theory for mixing Colours, to be practiſed by Painters, on the Principle of the priſmatic Colours, by Sir Iſaac Newton; which, I am perſuaded, was never yet reduced to Practice, and moſt probably never will.

He has entitled this 2d Part, New Principles of Linear Perſpective, or the Art of Deſigning on a Plane, the Repreſentations of Objects, &c. thoſe Words, *as they appear to the Eye*, being omitted; but, had he conſidered it as an Error, he ſhould have cautioned his Readers againſt it. It was the fate of this Treatiſe, alſo, to be overlooked, and neglected by thoſe, for whoſe uſe it was chiefly intended; ſo that, finding it was but little read, and the Principles, on account of its brevity, and the mathematical dreſs it appeared in, not being applied to practice, the Doctor (if we may credit Prof. Cowley) intended to publiſh another; and, in a more familiar Eſſay, to ſhew its pre-eminence above all others, and adapted better to the capacities of young Artiſts; which his Death preventing, that Age was thereby deprived of the advantage of ſo perfect a Work, as might be expected from his great abilities; which, however, has been abundantly compenſated ſince, and perhaps, better than he could have done. For it frequently happens, that another Perſon, ſeeing the Deficiencies of an Author, may diſplay the Principles he has ſet forth, to greater advantage than the Author himſelf was capacitated to do.

Remarks on Mr. HAMILTON, 1738.

THE laſt Eſſay of Dr. Taylor's was publiſhed in 1719, and nineteen Years after, in 1738, appeared a coloſſean Work, by J. HAMILTON, Eſq. F.R.S. between which Periods, I don't know of any other Publication on Perſpective. This Work is, very properly, entitled, A Complete Body of Stereography; it is dedicated to Sir Joſeph Jekill, Knt. Maſter of the Rolls; to whom he gratefully acknowledges great obligation, for puting it in his power to collect the ſcattered Fragments of a Work, which was begun, and had been carried on during the Receſſes of Buſineſs; and, but for him, had perhaps never been in a ſituation to viſit the World. He dates his Dedication from the Six Clerks Office; from which I conjecture, that he practiſed the Law, and that his Patron had put him into that Office, in Chancery.

This Work is indeed a moſt ſtupendous Production; but unfortunately for its Author, I fear, that his Reward was by no means proportioned to the Labour attending the execution of it; I am in doubt if he was refunded the Expence attending the Publication, much leſs paid for his Time in writing, digeſting it into the order it appears in, and reviſing it, from the Preſs, which has been done with great care and attention; inſomuch that, I never met with a falſe Reference in it, although they are ſo numerous. It is, to me, aſtoniſhing how he ever got through the Work; for, although I may be thought an Enthuſiaſt in the Subject, I would not, for any conſideration, be obliged to peruſe the whole, with the attention requiſite to a thorough Inveſtigation of it; for, being entirely and rigidly mathematical, there can be but little entertainment accrue from it. However, I candidly acknowledge, that I received information from it, in the Parts I conſulted, and full ſatisfaction; but, in all the 150 Plates, which it contains, there is not one ſtriking or intereſting Object; ſo that, to go through the drudgery of it, without ſeeing what ſhould reſult from it, in the executive part, muſt render it extremely irkſome.

In his Preface, he ſeems ſurprized at the low ebb in which Perſpective then was, and although ſo many Treatiſes on it were then extant, that ſo little inſtruction was to be obtained from them. He ſpeaks of Brook Taylor's, with reſpect; that ſmall Tract containing more real knowledge in it, than all the voluminous Works he had conſulted.

consulted. He might truly say so; and probably, his Production owes its Origin to it, in a great degree; although there are no traces of one in the other, yet there are the same Principles, throughout; and it is also probable, that if he had not found the Principles there, they would not have appeared so conspicuous in his Work, in which they are extended to the utmost. Yet, there are Principles, or Properties, in this Work, which are not touched on, by B. Taylor; such as the harmonical Division of Lines, which is here largely treated on, the use of the Comic Sections, in Perspective, with their transmutation from one to another, &c. Mr. John Hamilton

To enter into a critical examination of this Work, and to go through with it, would be almost as arduous a task as to write it; suffice it to say, that it is a valuable and extraordinary Performance, such as is rarely to be met with, on any particular Subject. It is divided into seven Books, and those subdivided into Sections; the Heads of which may, to some, be acceptable. The first is in five Sections; first, of Vision, Light and Colour, &c. 2d. The difference between Drawing and Perspective. 3d. Of the different kinds of Projection. 4th. Of the preparatory Lines and Points. 5th. How the Images of determinate parts of Lines are effected, by the height and distance of the Eye. The second Book is in three Sections, teaching the general Rules of perspective Geometry, respecting Lines and plane Figures. The third is in three Sections; the first treats of the properties of Lines, harmonically divided, &c. 2d treats largely of the Conic Sections, as they are useful in Perspective; the 3d, of their transmutation, with the methods of describing them. The fourth Book, in two Sections, treats of the nature and properties of Vanishing Lines and Points, and how to determine them; with the various methods of determining the Images of Points, Lines, and plane Figures. The fifth treats, first, of the projection of Shadows, in general; of reflected Light, from polished Planes; and 3dly, of the reflected Images of Objects, on polished Planes. The sixth Book is in five Sections; the 1st treats of the five regular Solids; their orthographic and stereographic projections, their Shadows and Reflections. The 2d treats of the Cone, its Image, Shadow, and Reflection; and the Images of its various Sections. The 3d treats of the Cylinder, in the same manner, with its application to groined Arches. The 4th treats of the Sphere, and its various Projections; the 5th treats of the Annulus. Book the seventh is in eleven Sections; the 1st is on fixed and immoveable Pictures, direct or inclined; the 2d is on Scenery, &c. the 3d, of drawing on vaulted Cielings, Domes, &c. the 4th, of Aerial Perspective, Chiaro Obscuro, Keeping, &c. The 5th, 6th, 7th, and 8th, treat of the Position of the Picture, Distance, Height of the Eye, and Dimensions of the Picture. The 9th, of the bad consequences of viewing a Picture out of the true Point of View; the 10th, of Anamorphoses and Deformations; and the last treats of the method of Drawing by Reticulation.

Such are the Contents of this wonderous Work; which Contents, being fully enumerated, take up no less than 36 large Pages, close printed, in small Italics, chiefly, a Volume of itself. I can say no more of it, than that I would recommend it to those who are curious, and desire a fuller Investigation of those matters than I have given, where they may find entire Satisfaction; the Theory in my Work being calculated for, and contains nothing but what is, really and essentially, necessary to the Art of Delineation. The Volume, contains 400 large, folio Pages, with 156 Plates; so that, in many places, there is one between every Leaf, but there is not a Picture, or one striking Figure in the Book; yet, the Diagrams are well devised, and, in their order, not badly disposed, in the Plates. In short, it is a copious, full, and extremely well digested Performance.

There are about 80 Subscribers in the List; it has a full and rather pompous Title-page, printed in black and red Letters, but no Frontispiece; the Arms of his Patron, well engraved, make a fine Headpiece to the Dedication; and I am sorry to add, that the first Impression, which I am of opinion, has not yet been sold off, may be had at some of the Book Stalls, new, and bound, for the paltry Sum of fifteen Shillings. I am indeed, and with reason, concerned, that his Time, was so ill spent; or, that he was so poorly rewarded (for his Time was not ill spent) as it is a tacit proof of the low estimation Perspective is held in.

THIS

JOSHUA KIRBY, 1754.

THIS Work, entitled "Dr. Brook Taylor's method of Perſpective made eaſy, both in Theory and Practice," is generally called, Brook Taylor's Perſpective; which has miſlead ſome who have it, imagining it to be really Brook Taylor's, in the original.

He tells us, in the Preface, that "his Deſign is, by exhibiting a new Syſtem of practical Perſpective, to make this hitherto intricate, but uſeful Art, eaſy and familiar to *every* Capacity; to dreſs it in the moſt ſimple Garb, that its Parts may be clearly ſeen, and its whole Deſign (ſo far as it relates to Painting, &c.) eaſily underſtood. For certain it is, that no Subject hath been treated in a worſe manner than this, notwithſtanding the many Volumes which have been wrote upon it; ſome purely mathematical, others wholly mechanical. My Intention, therefore, is, to ſteer between the abſtruſe mathematical reaſoning of ſome, and the tedious and falſe Explications of others; and from thence to produce a Syſtem of Perſpective upon certain and ſimple Principles, eaſy to be underſtood and applied to Practice."

One might reaſonably be led to expect, after ſuch a Prelude, that this Work would be ſo complete, in itſelf, as to need nothing more to be ſaid on the Subject. Indeed he ſays, in another Paragraph, that "(if I am ſo happy as to have ſucceeded in my Attempt) the whole together may be called a complete Syſtem of Perſpective, ſo far as relates to the Art of Painting," &c. That ſuch a Work was neceſſary is (he tells us) ſufficiently teſtified by many eminent Painters, and other curious Artiſts, who perſuaded him to proſecute his Deſign.

The Reaſon why he has entitled his Work Dr. Brook Taylor's Perſpective, is out of gratitude to him, becauſe (he ſays) he has furniſhed him with Principles to build on; and "becauſe his Work, though a very ſmall Pamphlet, *is thought* (not that *he* thinks it) the moſt correct, conciſe, and comprehenſive Book upon the Subject." That it is conciſe may be preſumed from the ſmallneſs of it; but, that it is moſt correct and comprehenſive, certainly does not appear by his deviating ſo much from the Doctor's Method, or Order, which (he ſays) is not conſiſtent with his Plan; and, his attempt to render the Author's Meaning more intelligible; for he ſays (farther on) that "although the Doctor's Treatiſes are ſo very curious and uſeful, few have been able to underſtand his Schemes, or apply them to Practice;" which is a palpable Truth.

Next he tells us, when Mr. Hamilton favoured the World with his complete Body of Stereography, which (he truly ſays) has been of little uſe to Students in the Art of Deſign, they not being able to comprehend it. However, he acknowledges it to be the beſt Syſtem of Perſpective Projection that ever was, or perhaps ever will be made public (in which I agree with him) "that he ſhould be very ungenerous, in not confeſſing the great ſervice it has been to him; being indebted to him for ſome Things which he ſhould never have thought on, had not Mr. Hamilton pointed them out to him; by which public Acknowledgment, he hopes to eſcape the imputation of Plagiariſm; and be a ſufficient Apology for the liberties he has taken with his Work." By this plain dealing, he may paſs on the World a meer Compilation for a Work of his own.

In this, we have an Inſtance of the Author's Candour and conſummate Modeſty, for which he was remarkable; but I conſtrue it, in ſome caſes, an extreme Diffidence, of which we have ſeveral Inſtances. In his Dedication of the firſt Part, to Mr. Hogarth, he ſays, "this Work, in a peculiar manner, has a right to your Patronage and Protection; as it was you who firſt encouraged me to write upon the Subject; and, if it has *any* Merit, the Public, in a great meaſure, are obliged to you for it." In his Dedication of the ſecond Part, to the Academy (then inſtituted) of Painting, Sculpture, &c. he ſays, "that it is the Product of many Years Application, and Study," (which, I think is not much to his Credit, being no better.) "I do not preſume to offer any thing new to the principal Members of the Society (ſays he) for I am not ſo *vain* as to think I can give *any* Inſtructions to Perſons of ſuch ſuperior Abilities; but if I can contribute *a little*, towards inſtructing the Pupils," &c. I am ſorry to find, that the preſent Age, of Artiſts, have neglected to improve on the knowledge they had of Perſpective, at his time of writing. In

an Appendix he ſays, " When I firſt engaged in this Undertaking, I much dreaded the Difficulties which preſented themſeves, both from my own Incapacity, and from the nature of the Subject, &c. I was therefore determined to proceed very cautiouſly, to view every Article in various Lights, and not to print *any* thing without having it firſt approved of by competent Judges." Joſhua Kirby.

By theſe Paſſages, it ſeems, that the World is not ſo much indebted to him as to others; if *he* was not ſufficiently acquainted with and *competent* in the Subject, after ſo much aſſiſtance from other Authors, and *ſo many* Years Study and Application to it, who was to judge for him? could it be ſuppoſed, that thoſe who had but ſuperficially ſtudied it were more competent? If he was not competent, himſelf, he was unfit to write on the Subject; and indeed, the puerile manner in which he has treated it plainly evinces that he was not.

In the introductory Part to the Theory, Chap. III. he begins thus: " Perſpective is the Art of drawing upon any Surface the Repreſentation of Objects, as they appear to the Eye," &c. " This is a general Definition of that kind of Perſpective I am going to explain; which is, only, what relates to the Arts of Painting and Deſigning, but not to any of the *mathematical Arts*, which are too abſtruſe for my Speculations," (this is a Truth, I believe.) " And although perſpective Repreſentations may be drawn upon *any* Surfaces, be they ever ſo irregular, yet I ſhall firſt confine myſelf to *ſmooth*, *even*, Planes; ſuch as a Canvas, Wall, Cieling, or the like."

Was ever ſuch a Definition given before? Firſt he ſays, " Perſpective is the Art of drawing upon *any* Surface;" which I deny; for it is on a Plane Surface, only, ſuch as he propoſes to confine himſelf to, at firſt; the Qualities, ſmooth, and even, are ſuperfluous. If a Surface be not even, and every way uniform, it is not a Plane; ſmoothneſs is not a neceſſary Attribute. After giving a proper Definition of a Plane, as lying evenly between its Bounds, he adds, " thus any *ſmooth* Surface is a Plane Surface, and is *therefore* called a Plane;" by which Criterion, any Surface, whatever (even of a Statue) being ſmooth, is a Plane.

Again; he ſays, Perſpective is to draw the Repreſentation of Objects, *as they appear to the Eye*; which is falſe; for the Appearance of an Object and its Repreſentation, on a Plane, are two Things, which cannot be united. This I have clearly proved; Art. 3. Sect. 6. Book II. P. 93. for, a Globe always appears round, in every ſituation; but its Repreſentation is ſo only in one; in every other, it is an Ellipſis, or Oval, and may be in any degree excentric. A Circle appears a Circle in one ſituation only; but its Repreſentation is a Circle, frequently, when it appears (*to the Eye*) very elliptical.

" This (he ſays) is a general Definition of the *kind* of Perſpective I am going to explain," and, in another place he ſays, " I have avoided the more general Definition, viz. of drawing the Repreſentation of Objects by the Rules of Geometry" (by what Rules, then, would he draw them? I know of no other, in Perſpective) " as it appeared to be more ſignificant of what I intended to expreſs, by the term Perſpective; for, ſince we form our Judgment of the Appearance of Objects from Cuſtom and Experience, and not from mathematical reaſoning; therefore it ſeems reaſonable *not* to comply with mathematical Perſpective (or, rather, *exactneſs*) in ſome particular Caſes." Was ever ſuch futile and abſurd Argument advanced, by any Perſon who was attempting to treat on the Subject, on infallible Principles? What he means by the *kind* of Perſpective, I am at a loſs to deviſe; I know but one kind, though it may be performed by various methods. Perſpective is the Section of an imaginary Cone or Pyramid of Rays, by a Plane, in any determined Poſition; and I know no other way of obtaining a true Section (from a given Station) but by geometrical Rules.

This Work is divided into two Parts, or Books, viz. Theory and Practice; the firſt is ſubdivided into ſeven Chapters; and thoſe again into Sections. In the firſt, he deſcends to tell us, what Utenſils are neceſſary in Drawing; and deſcribes ſome of their uſes; which is as puerile as need be. The 2nd. contains ſome Definitions in Geometry, from Simpſon and Pardie, he ſays, which he has attempted, to improve on; a Specimen of which is given, of a Plane. In the 10th he ſays, " Every

Joſhua Kirby.

quadrilateral Figure whoſe oppoſite Sides are parallel, but *not equal*, is a Parallelogram; ſo that, a Square, or Rhombus is not a Parallelogram, which I preſume is his meaning; but it implies that the oppoſite Sides of a Parallelogram are not equal. The 3rd. contains a few common Problems, which finiſhes this Chapter. The ſecond is wholly taken up with Extracts from Newton, and Smith's Optics, or from Rowning, Rohault, and Martin; which are of no uſe in the Work, as he has treated the Subject.

Chapter 3. Sect. 1ſt. is Introductory, reſpecting the elementary Planes, in Theory, which he does not define; the Geneſis of Vaniſhing Lines, and Vaniſhing Points; theſe he illuſtrates by inſignificant Schemes, which, in ſome reſpects, do not make it clear. The following is a Specimen of his Judgement or want of perſpicuity. "From hence, then, we may perceive, that the various Situations of Objects* may be reduced under three general Heads. 1ſt. When they are perpendicular to the Picture, or parallel to the Ground" (as if they could not be perpendicular to the Picture, and alſo to the Ground; or inclined to it). 2nd. "When they are parallel to the Picture, or perpendicular to the Ground (ſurely they may be perpendicular to the Ground, without being parallel to the Picture; Lines cannot, to a vertical Picture). 3rd. "When they are obliquely ſituated to both, &c. Sect. 2. contains ten Definitions and five Theorems, with four Corollaries, which is the whole of his Theory, in four Pages and a half; the conciſeneſs of which will ſuit with the Diſpoſitions of many. Some of his Definitions are limited and partial, not explicit, and the whole Theory is trifling; yet ſome of his Diagrams for Illuſtration (he cannot be ſaid to demonſtrate) though petit are well deviſed. Sect. 3rd, 4th, and 5th, ſhew the Affinity between the imaginary poſition of the elementary Planes, in Theory and their Application in Practice; which is rather ingenious, on the whole.

Chapter 4th. Sect. 1ſt. treats of Cieling-Pieces, or horizontal Pictures, in which there is nothing worthy of Remark. Sect. 2nd, on inclined Pictures, is not void of Merit. The 3rd, and laſt Section, is intended to deſcribe the method of delineating on cylindrical Cielings and the concave ſurface of a Dome, of which I have made mention; Sect. 7. Page 65.

The 5th Chapter is on the Theory and Projection of Shadows, in general. An Acquaintance of mine has ſometimes ſaid, that if there was *any* Merit in this Work, it was in the Shadows; which induced me to conſider it with more Attention. The Introduction is puerile beyond belief; in which he ſuppoſes Light to flow from the Luminary in Planes. It is very eaſy to imagine a Plane to paſs through any Ray; or, vertically, through the center of the Luminary and the Eye. However, in order to give himſelf Conſequence, he ſays, "it is therefore very ſurprizing, that almoſt every Author, who has handled this part of Perſpective, ſhould have committed ſuch egregious Miſtakes, in giving ſuch Rules as are falſe in Theory, and in Practice moſt abſurd." In another place he ſays, "and ſince the Rays of Light do always proceed in ſtrait Lines, therefore, when they paſs over the extremities of an Object, they leave a Space unilluminated, which Space is called, *the Projection of the Shadow of the Object*." What an unmeaning Expreſſion; the unilluminated Space to be the projection of the Shadow. To give ſtill more conſequence to himſelf and his Subject, the ſecond Section, on Shadows projected by the Sun, is (with great formality) diſpoſed into Lemmas, from which he deduces Corollaries.

The firſt is "If the Rays of Light come from behind the Picture, towards the Spectator's Eye, then, the Vaniſhing Point of thoſe Rays will be above the Horizontal Line." The ſecond is in theſe words. "In the laſt Figure, *we* conſidered the Rays as coming in a Plane perpendicular to the Picture, *we* ſhall now ſuppoſe them to come in a Plane oblique with the Picture." After which, follows this Corollary: "From hence we may obſerve, that when the Light comes from behind the Picture, towards the Spectator's Eye, the Seat of the Rays will always be upon the Horizontal Line; and, in that Point which is the Vaniſhing Point *of the Plane*, in which the Rays are ſuppoſed to come." The whole, of

* What he calls Objects, here, are, ſimply, plane Figures; Rectangles, or other Parallelograms.

which, is abſolutely beyond my Comprehenſion. By the Seat of the Rays, he muſt mean the Seat of the Luminary, on the Ground; which, being conceived at an infinite Diſtance, is in the Horizon; and conſequently, its Repreſentation, on the Picture, is the Vaniſhing Point of the Seat of a Ray of Light, on the Ground, which is alſo infinite. In the 4th Lemma we have theſe words. "From whence it follows, that when the Rays come in this Direction, the Appearance of *their* Shadows upon the Picture will be parallel; for the very ſame Reaſon, that the Repreſentation of any original Plane, which is parallel to the Picture, is *exactly* like its Original." What he means by *their* Shadows is not very obvious, for it expreſſes the Shadows of the Rays. The latter part is full as unmeaning, except when applied to plane Figures, ſimply, whoſe Shadows are projected on a Plane to which they are parallel; and then, although they are really ſimilar, they will not be ſo repreſented. Theſe Lemmas are, meerly, Caſes, ariſing from the different ſituations of the Luminary, of which, there are but three. Lemmas are Propoſitions, preparatory to the Demonſtration of ſome Theorem which follows; here is nothing to be proved; for, although he begins with an If, he might have added, any Perſon be ſo ignorant, as not to know what he undertakes to prove (knowing the Premiſes) he muſt be an arrant Blockhead. Joſhua Kirby.

After this Theory, follow four Methods (as he calls them) of projecting the Shadow. The method is the ſame in them all, differing only from the ſituation of the Luminary, as in the three preceding Caſes; or (begging his Pardon) Lemmas. It may be obſerved, that he frequently ſays, the Vaniſhing Point of the *Plane*; therefore it cannot be an error in printing, nor can I attribute it to Ignorance, wholly. To make ſhort work of it, I pronounce it to be, altogether, moſt abſurd, and unintelligible; and, the Diagrams are on a piece with it, for the contrivance of which, I gave him full Credit. Sect. 2d. (the ſhorteſt in the Book) is on Shadows by Candle Light, comprized in leſs than 22 Lines; conciſe enough.

Chapter VI. treats of the diſtance and height of the Eye, as being productive of Diſtortion, when not properly choſen; in which he ſays, that, by being too near, the Figure which ſhould repreſent a Square is a Parallelogram; (as if a Square was not a Parallelogram) and, "However, for Pictures with curvilinear Objects, the Diſtance ſhould be taken as great as poſſible." (Why for round Objects particularly?) 3rd. The Conſequences of viewing Pictures, out of the true Point of Sight; after what little he does ſay (but without a Diagram to illuſtrate it) he adds, that it relates chiefly to Pictures painted on uneven Grounds, ſuch as Domes, vaulted Roofs, irregular Walls, &c. a ſtrange and unexpected concluſion. 4th. Of the ſize of the Picture. 5th. Some Conſiderations upon the Appearances of round Objects upon the Picture; in which he quotes theſe Words, from Monſ. Freſnoy. "Though Perſpective cannot be called a perfect Rule, for deſigning, yet it is a great Succour to Art, and facilitates the diſpatch of the Work? though frequently falling into Error." This Chapter relates, chiefly, to an imaginary Error in Perſpective, of Columns increaſing in their Diameters, on a Picture which is parallel to them, the farther they recede from the Center, and conſequently from the Eye. (See Sect. 6. B. II.) After expatiating on this wonderful Paradox, he gravely aſks; "Now, the Queſtion is, whether Columns, ſituated in this manner, are to be thus repreſented on the Picture or not?" I anſwer yes, if the Eye can always be confined to the Point of View. "In ſhort (he ſays) Perſpective, in a ſtrictly Mathematical or Optical Senſe, is one Thing, and Perſpective, according to the Acceptation of that Word among Painters, is another: The Firſt teaches how to deſcribe on a Plane, to a mathematical exactneſs, the Projections of any Objects; but the Second, like a modeſt and judicious Maſter, teaches the moſt ſimple and general Principles of Art, &c." I would aſk him then, for what purpoſe he has preſcribed mathematical Rules, if we are not to adhere to them? and by what Rules thoſe *ſimple* Principles produce the much wiſh'd for, and deſired Effect? of which, he (Painter-like) is ſo enamoured.

The 7th Chapter is on Aerial Perſpective. Chiara Obſcuro, and Keeping, which being *wholly* quoted from Mr. Hamilton; I ſhall make no other Remarks on it here, than, that it is judicious, and like Mr. Hamilton's whole performance.

I now

Joſhua Kirby.

I now proceed to the ſecond Part, or (as he ſays) *proceed we now* to Book II; which is dedicated to the Academy for Drawing (then lately inſtituted); not the incorporated Society, but prior to it, called the Aſſociated Society, for the relief of diſtreſſed Artiſts; patronized and encouraged by the Society of Arts and Commerce, in whoſe great Room (in the Strand) they firſt exhibited; he being a Member of that Fraternity. He begins with preparing the Picture, regulating the height and diſtance of the Eye, &c. in which he is extremely dogmatical. (See Sect. 3. B. II. P. 112.) He concludes with, "I think if a medium between thoſe two Diſtances be taken as a general Rule, it will produce the moſt agreeable Shape of any Diſtance whatever;" truly ridiculous. On the contrary, I adviſe the width of the Picture to be the leaſt Diſtance taken, in all common caſes, and that is the greateſt he propoſes; but he makes it the Perpendicular of an Equilateral Triangle, only.

This is of a piece with the whole of this Book, on which, to enter into a minute Criticiſm I ſhall not, for it would make a Volume, larger than the Work itſelf; but muſt ſay, that the whole is puerile in a degree beyond belief, by thoſe who have not examined it with attention. To point out any Part in which there is *any* Excellence, I cannot; the Stile, the Diction, the Figures, and the Terms uſed, are all peculiar to himſelf, not one Object to recommend it to notice; yet the Rules may be obtained from it. Although he is a great ſtickler for uſing no more Lines than are neceſſary, yet, all his Figures are circumſcribed with a Frame; that is, encloſed in a Rectangle, ſuppoſed to be the Dimenſions of the Picture, which anſwers no End whatever. He is ſtudious to avoid Difficulty; the ſituation of his Objects, (ſuch as they are) are either parallel, or inclined, equally, that is, in 45 Degrees, generally; the Subjects are not very complicated; but when you imagine that he is juſt entering on the Deſcription, and want his Aſſiſtance, he takes his leave abruptly, and ſuppoſes all the reſt may be conjectured; or, that his Reader has a better Capacity than himſelf, to do what he cannot. It abounds with Errors, although the References are few, and often refers to Letters which are not to be found; and (what is very diſagreeable) mixes Figures (or the Symbols of Numbers) unneceſſarily, with Letters, which are diſagreeable, in peruſal, to refer to. Sometimes he has the ſame Letter twice over, in the ſame Figure, without any reaſon for it, and oftentimes the Lines referred to are not drawn; he ſeems, by choice, to prefer the Letters at the farther end of the Alphabet, to thoſe which are more familiar; which have not that ſmoothneſs the others have, in reading; and he often uſes old Engliſh Letters without any apparent reaſon. He affects a much greater knowledge of Geometry than he was poſſeſſed of, whilſt his Expreſſions, his Definitions, and his manner of performing many of his Operations evince, that he was a very ſuperficial Geometrician. He never introduces the Doctrine of Proportion, but by Numbers, not by ſimilar Triangles; always dividing his Lines into equal parts to find a Proportional, though done with ten times the facility, and much greater accuracy, geometrically.

He pretends to be familiar with the regular Solids, and one would imagine he was going to diſplay them, in Perſpective; but he is ſatisfied with the Tetrahedrion, and that, in the moſt direct and ſimple poſition; and the Cube, which he diſſects in all Poſitions, Couchant, Rampant, and Volant; yet always regular in its Conſtruction. Theſe two Examples, he ſays, are ſufficient, to ſhew how the reſt may be delineated. Inſtead of which, he preſents us with a canted Cube, and a double Croſs, compoſed of Cubes, his favourite Object; though given in the ſimpleſt poſition it can be, and performed according to all the late Writers, he, *very modeſtly*, tells us, that he has added this Figure to ſhew the vaſt eaſe and expeditiouſneſs of *this* Method preferable to *any* other yet made public; and ſays, that there are no more than four Lines in the Operation, but what are a part of the Repreſentation; yet one of thoſe is uſeleſs, and others are omitted. What need can there be for many Lines, when all the Faces, which are parallel to the Picture, are Squares; and the only Vaniſhing Point is the Center of the Picture.

His whole attempt at Mouldings is in two Pedeſtals, one parallel, the other equally inclined; the Mouldings are a Cyma recta, inverted for the Baſe, and a

Cyma reverſa for the Cornice; or Capitalhe calls it. Theſe he does not finiſh, nor ſo much as draw a Line for the Mouldings; but only makes triangular Brackets at the Corners (in one of which he draws the Curve) and a direct Section in the middle of the front Face. There is an attempt at the Tuſcan Baſe and Capital, for a Column; but nothing more than a preparation is made, by drawing the ſquares of the Plinth, and Shaft, deſcribing a Circle in each, and making a direct Section of the Mouldings. There are two finiſhed, and two more with half the Mouldings only, leaving the other half blank; here are alſo two Corinthian Capitals, one finiſhed, as he ſuppoſes, the other with but the lower tier of Leaves and Abacus, with three or four Circles; two of which being added to the finiſhed one, the other is uſeleſs; alſo, two of the former might be well ſpared; but this Plate is to attract the Eye, being engraved by E. Rooker (the only one) but unworthy of his touches, the Drawing being vile and execrable; what ſhould be an Ovolo, in the Capital, is a Torus; and the Torus, in the Baſe has more the appearance of an Ovolo, inverted. There are two more Plates for ſhew; one repreſents a Maſon's Yard, with Blocks of Stone, in Cubes, Priſms, Cylinders, Cones, and the five Solids; ſome on their Angles, like Tops, ſpining; all promiſcuouſly ſituated, apparently, yet in regular order, without judgment or taſte; the other Plate contains two Landſcapes, for no uſe at all. After theſe he makes a lame effort, in the next Section, and three Plates, at horizontal, or, as he calls it, the parallel Picture; from which he recedes (like a Coward from his Antagoniſt whom he has braved) without accompliſhing what he aimed at; yet he is ſo bold as to make an attempt on the Human Figure; but the attempt is little better than a Rape, for it is a proſtitution of Genius. Joſhua Kirby.

The next Section is on Shadows; and on Reflections, in which there is not the leaſt Genius; being all common place, trifling Examples and Objects; nothing that is curious, or in the leaſt degree, intereſting. He is miſtaken in the Object, marked 4, at a diſtance; for, being on a Hill, its reflected Image would appear in the Water, its height being meaſured from the Surface.

His next effort is on Scenery, with which he is not at all acquainted. He ſays, as it is impoſſible for him to treat it in a better manner than Mr. Hamilton has done before him, he ſhall refer his Readers to him and Pozzo, if what he ſhall offer on the Subject, be not ſufficient. He ſurely, could not ſuppoſe it is; nor all of them together. After this Section follows an Abſtract of the Methods uſed by various old Authors, which he compares with what he calls his own. In which compariſon, he throws more Lines than are neceſſary into theirs, and abridges his own of what are really neceſſary, and then paſſes Judgment in favour of his own; for which, his double Croſs is introduced as an Evidence.

Laſtly, we are favoured with an Appendix of about ten Pages, which he begins thus. "The favourable Reception of the firſt Impreſſion of this Work, had been a ſufficient inducement for publiſhing a ſecond Edition, if the number of my Subſcribers had not made it abſolutely neceſſary." After the next Paragraph, part of which is already quoted, Page 101, he ſays, "As it ſeemed the moſt likely means to prevent his publiſhing any Figures which were uſeleſs and undigeſted, ſo he thought it would ſecure him from little ill natured Criticiſms; and he confeſſes (with the utmoſt Gratitude and Thanks) that his Succeſs has abundantly exceeded his utmoſt Expectations (this he might truly ſay, or any body's elſe) for he had been ſo fortunate as to have the Work ſo approved, and recommended, by Gentlemen of great Genius and Knowledge, that he now began to think it ſecure from public Cenſure, under their kind and powerful Protection. This may be called *Modeſty*, but, being ſaid of ſuch a Production, rather ſavours of *Preſumption*, in my opinion. The powerful Protection he had, might indeed be a means of recommending it to many, who were not Judges; but if we may credit thoſe who are, I can aſſure him that it has not eſcaped private Cenſure, nor ſome public; nor is the great good Fortune he enjoyed, any proof of the merit of this Production, although a chain of Conſequences, ariſing from it, might be the Cauſe. The public attack on his Abilities (ſee Page 107) is a proof that this is not my own private Opinion, which,

Joſhua Kirby.

by ſome, may be imagined to ariſe from Spleen; than which nothing is farther from my Heart, nor did I know the Author. On the contrary, it would give me pleaſure, to find that his Merit (for which he was rewarded) bore any proportion to the Reward; for ſurely, nothing can give greater Satisfaction to a liberal Mind, than to ſee *real* Merit patronized and rewarded by thoſe in Power.

The Appendix contains ſome farther Obſervations on Shadows by the Sun; already twice handled in the foregoing Work. It ſeems as if he had made ſome new Diſcoveries in that part; for, in it, he diſplays more of real Principle, in projecting them, than before; though he lays down no general Rule, and confines his Examples almoſt wholly to perpendicular Objects, or Lines; nor ever conſiders their poſition to the Plane on which the Shadow is projected, though moſt eſſential.

Next he ſpeaks of the down Hill, or direct Deſcent, as having always appeared of great Difficulty to Painters, and will, he ſays, ever remain impracticable, ſince in the nature of the Thing it is impoſſible to be done. Of this Matter I have already ſpoken largely, in Sect. 6. Book II. Art. 8. Page 97. and have given another Specimen or Example, as a proof to the contrary, in this Appendix (Sect. 3.) in which I have made appear, that the ſame Space taken on the Picture ſhall appear either to aſcend or deſcend; though not (as he ſays *ſingly*, or) ſimply as ſuch, but from the concurrence of Lines and Objects ſituated on, or adjacent to the Plane. A ſlight touch on Birds Eye Views, which is moſt paltry; with the deſcription of an Inſtrument for taking extenſive Views, of his own Invention, he ſays, conſiſting of a horizontal and an upright Scale; which I have deſcribed Page 26, and the deſcription of a Camera Obſcura, for the Pocket, concludes the Appendix.

This Work is in quarto, containing 172 Pages, and 51 Plates, in the whole; with a Frontiſpiece, deſigned and drawn by Mr. Hogarth. 'Tis a humorous Piece, ſhewing the abſurdities a Perſon may be liable to, who attempts to draw without having ſome knowledge in Perſpective. As the Production of that great Genius, it is entertaining; and, though abounding with the groſſeſt abſurdities, poſſible, may paſs and pleaſe; otherwiſe, I think it is a palpable inſult, offered to common Senſe, and tacitly calling the Artiſts a parcel of egregious Blockheads. There is not a finiſhed Piece in the Book, but the Maſons Yard and the Landſcapes; ſo that, I queſtion if the whole of the Plates were 40 Pounds expence. It was firſt printed for himſelf, at Ipſwich, dedicated to Mr. Hogarth, and publiſhed in the Year 1754.

Ware's Sirigatti.

IN the ſame Year, and ſoon after Mr. Kirby publiſhed his firſt Impreſſion (in 1754) Iſaac Ware, Eſq. publiſhed a Tranſlation of Lorenzo Sirigatti (originally in Italian) which had been advertized ſome time before (about the time that Kirby's made its Appearance) ſetting forth, that a Work, on Perſpective, would ſhortly be publiſhed, on the moſt ſimple Principles poſſible, the eaſieſt to be conceived and applied to practice. This was done (as I am informed) with intent to prejudice the ſale of Kirby's; between whom, and Mr. Ware, ſubſiſted a ſettled Animoſity. A Paſſage in the Preface, which is very ſhort, ſeems to indicate the ſame; for, he pretends that he is not influenced by the hopes of Gain, ariſing from the Sale of his Publication, having no expectation of it; and I cannot attribute it, wholly, to public ſpiritedneſs, a diſpoſition to benefit others at his ſole expence, whatever pretences may be made on that ſcore, without ſome Vanity, or Spleen, be gratified in it; yet, if we will give Mr. Ware credit for it, that was the chief if not the ſole motive for his publiſhing it, in which I cannot acquieſce, implicitly.

This Work is in folio, comprized in forty-three Pages, called Chapters, though many of the Pages are not half full; a Plate faces every Page, the deſcription of one being printed on the back of another; to ſome Chapters there are two Plates; the Figures are unneceſſarily large, and but little work in them, ſo that, it had been better in a quarto Volume. There is nothing either ſtriking or intereſting in it, being all plane Figures, and ſimple Objects; a Violin, or other Viol, and a Guittar are the principal. As I have, in the firſt Section, given a full account of the Method here made uſe of (as in Vignola) it is needleſs to dwell longer on this Work, which was, altogether, undeſerving to be revived, at that time; as the Arts, I am perſuaded, would not be much improved, or benefited in it.

NOT

NOT long after this Work, by Mr. Ware, appeared, Mr. Kirby drew up a Parallel between the Methods of practice, according to Sirigatti, and Brook Taylor, whose ſuperior Method he had, ſo lately, publiſhed an explanation of; between which, it muſt be obvious to every one, there is no compariſon; the one being performed on the moſt perfect geometrical Principles, the other is a meer mechanical Proceſs, dependant on no Principle, but built wholly on the ſuppoſition that Viſion is conveyed in a right lined Direction, which is taken aſſumptively, and not, by a Poſtulate, requeſted to be granted. KIRBY's Parallel.

The true Date of this extraordinary Performance I cannot aſcertain, as it is very rare to be met with, the Sale of it being ſuppreſſed. I remember having ſeen it, and remember alſo, that I thought the Author of it diſplayed more warmth than was neceſſary for the Cauſe, and a greater ſhare of Acrimony on its Author than I conceived him warranted in, being ignorant of the Difference ſubſiſting between them; inſomuch that, his Zeal, in the Cauſe he had eſpouſed, hurried him into ſeveral Errors, and ſome unbecoming, rather ſevere Reflections on his Adverſary, which retorted on himſelf, and clearly ſhewed him not to be that modeſt Author, and inoffenſive Man, he was reputed to be. As I cannot now ſay more of it, from memory, I ſhall only quote a few Paſſages from the Monthly Review, for January 1758, to which I refer the Reader for a full account of it; it begins thus:

"The Author of theſe Remarks is informed, that Mr. Kirby hath the character of a modeſt and good natured Man; if he deſerves this character, will it not be difficult to account for his manner of treating Mr. Ware, in this performance?—The aſſuming air and ſufficiency with which this Comparer dictates, appear very unbecoming; and would be offenſive though his principles and his practice were without an error; but if his errors are apparent, and if he is miſtaken, even where he exults in his own ſuperior ſcience, how ſhould ſuch a Man be treated?——The following citations from his own Book, in his own words, will ſhew how he is diſpoſed to treat others in ſuch caſes."

Here, Mr. Kirby cites a Paſſage from Sirigatti (Mr. Ware's) reſpecting the perſpective Repreſentation of a Circle; which, being an oval figure, called an Ellipſis, he thinks may be much eaſier performed, by taking the greateſt Diameter from the Section-line, and the leſſer on the vertical Section.

After which Citation, he ſays; "That a regular Ellipſis is the perſpective Repreſentation of a Circle, is an abſurdity, I believe, not to be met with in any other Book on this Subject; for every one muſt know (who knows any thing of Perſpective) that the fore-part of a figure which repreſents a Circle is more round than the back part of it, becauſe the former is nearer to the eye than the latter; and therefore, the figure cannot be deſcribed by any two Diameters whatever." I well remember, though it is many Years ſince I ſaw this Performance, that this Paragraph was ſmeared all over with Ink, through which it was legible; which induces me to ſuppoſe that he, having diſcovered his error, too late, had ſerved all the remainder of the Copies ſo; poor compenſation to his preſumptive Arrogance.

The Author of theſe Remarks, now, interrogates him, reſpecting the perſpective projection of a Circle; whether it is not, neceſſarily, that Section of the Cone of Rays, by the Picture, which produces an Ellipſis? &c. and adds, If this be ſo, then, according to his own Note, he knows nothing of Perſpective; becauſe no Perſon can know what is not, in the nature of the thing, to be known; conſequently, by his own argument, he knows *nothing of Perſpective*.

Now, what can be ſaid in vindication of Mr. Kirby's, or, after ſuch a proof of his Ignorance of ſo eſſential a part of the Science he has heretofore taken upon him to treat on, what opinion muſt we form of his Modeſty? has it not the appearance of a Maſk for Arrogance and Self-conceit? What poor, futile argument, that the hither part, being nearer the Eye, appears rounder than the oppoſite; he ſurely never conſidered that the one is convex, towards the Eye, the other concave, which is the cauſe of their appearing equally and ſimilarly curved. All that can be alledged in excuſe for him, in this, and, as I conjecture, what has led him into the Error is, that the repreſentation of any Diameter of a Circle is not the tranſverſe

Kirby's Parallel.

Axis of the Ellipſis which repreſents it; becauſe, the hither Semicircle, neareſt the Picture, has its repreſentation, on the Picture, larger than the other; but it does not follow, that the whole together is not a perfect Ellipſis.

Can ſuch a Perſon be fit to write on a Subject, and lay down Rules for others, who has conſidered it ſo very ſuperficially himſelf? To ward off the imputation of Plagiariſm, he acknowledges that he has taken great liberties with Mr. Hamilton; but ſurely, he never examined the ſecond Section, of the third Book, or he did not clearly comprehend what is there advanced on this Head; where, although he ſays, that it is an abſurdity not to be met with elſewhere, he might have found the abſurdity (if it be one) fully and clearly demonſtrated.

After ſeveral other trite Remarks, on various Paſſages, and quotations of very ungenteel Reflections by Mr. Kirby, on his Adverſary, in ſpeaking of Shadows, he ſays, "it is impoſſible to find the Shadows, but on the Principles of Dr. Taylor;" in which he is greatly miſtaken; for they may be found, or determined, though with more labour, and have been, by various Authors. In reſpect of his own Shadows, the Author of theſe Remarks obſerves, juſtly, that although they are truely projected, reſpecting the figure, or outline, yet, in every other reſpect they are abſurd, and unconſonant with, or wholly repugnant to, the well-known, eſtabliſhed Law of Nature.

He remarks on a manifeſt error, in the repreſentation of his (Mr. Kirby's) winding Stairs; and that the error in the Tetrahedon, by Sirigatti, is not owing to the perſpective projection, but to the geometrical conſtruction; on which Mr. Kirby has theſe words. "Had Mr. Ware known how to put only this ſingle Object into Perſpective*, upon true principles, he would never have given himſelf the trouble of publiſhing the tranſlation of a work which does not contain one true principle; but is thoroughly diveſted of all mathematical *Data*, and hath not even a ſingle figure that is truely drawn, or which diſcovers the leaſt taſte or elegance." Theſe laſt words may, with juſtice, be applied to his *own* Work.

With reſpect to the truth of Sirigatti's Principles, the Author of the Remarks juſtly obſerves, that, if by Principles he means Theory, there is no pretence to any; but, if he means that the practice is falſe, he is miſtaken, for though tedious, it is not falſe; but, as I have heretofore obſerved, more to be depended on, in many caſes, than the new Method, by Brook Taylor, which, in ſeveral places, he calls *my* Method. And, for the latter part of the Sentence, "thoroughly diveſted of all mathematical *data*," he acknowledges his ignorance of the ſenſe of the word *Data*, in that place, and juſtly apprehends, that Mr. Kirby does not underſtand the meaning of the Word; and indeed, I am of opinion, that he made uſe of it for no better reaſon than, imagining there was ſome deep, and latent meaning couched under it, he aſſumed, thereby, an air of mathematical Conſequence.

I ſhall paſs over the Paragraph in which he remarks on Mr. Kirby's preſuming to applaud Sir Iſaac Newton, in preference to all others; inſinuating thereby, that he has read, comprehends, and has compared him with others, elſe, how is he warranted to beſtow ſuch praiſe on him? and take notice of the next; in which he obſerves, that, "all perſpective repreſentations which are not produced by a proper diſtance of the eye, will be falſe and erroneous." And again, ſpeaking of the Author of a Print of the Horſe Guards, he ſays; "He did not know, I preſume, *ſcientifically*, that there was an *abſolute neceſſity* of chooſing a proper diſtance." Now, if by proper Diſtance (adds our Author) he means one true and certain Diſtance, determinable by Rule, and capable of Demonſtration, as he ſeems to do (and ought to mean nothing leſs, by what he aſſerts) there is no ſuch thing in nature; nor can ſuch a Diſtance be aſſigned, but that, either nearer or farther off will be equally true; and that it is not owing to Diſtance, which renders the Perſpective falſe or erroneous.

It is indeed certain, that one Diſtance may be preferable to another, but it is entirely diſcretional, and depends on the judgment of the Artiſt only; the truth

* How poor are the Expreſſions of puting, and throwing, Objects *into* Perſpective; as it is frequently expreſſed by him, and other Writers on the Subject.

of the Projection does not, in the leaſt, depend on the Diſtance taken, though on a prudent choice depends, in a great degree, the excellence of it, in the harmony and agreeable diſpoſition of its ſeveral Parts; which I have exemplified, in various Inſtances, and been very particular in. Joſhua Kirby.

Whoever was the author of theſe Strictures (the above is but an Abſtract) which have, now, been twenty-four Years before the Public, he was well qualified for the Undertaking, and has diſplayed great Judgment, mixed with Candour; but he has overlooked a Circumſtance, which ſhews that (being intended as a Parallel) Mr. Kirby dealt very unfairly in it. For I well remember, that he crowded more Lines into the Diagrams of his Adverſary, and abridged his own of what were eſſential in them; in order to make the other appear intricate and perplexed, compared with his; which is a piece of diſhoneſt Art, too frequently practiced on ſuch occaſions. He concludes with, "Indeed, the appearance of Modeſty diſcoverable in his firſt performance, may have warded off the Cenſure which might have been paſſed upon ſome miſtakes in that Work.—And pity it is, that in this latter Publication he diſcovers ſo much Arrogance and Self-conceit. It may not, therefore, be improper to remind him, that even Merit acquires *new* charms, when attended by that graceful Nymph called Modeſty. That Ignorance herſelf does not ſhock us, when ſhe chances to be ſeen with that amiable Companion. But, when ſhe is obtruded on the Public by her uſual Aſſociates, Arrogance and Obloquy, a more diſguſtful appearance is hardly to be met with."

Mr. KIRBY, Author of the foregoing Parallel, and the preceding Work on which I have remarked, ſeems at this time to enjoy, unrivalled, the whole Field to himſelf, without a Competitor. Being ſucceſsful in the ſale of what remained of the firſt Impreſſion after ſerving the Subſcribers, a ſecond was printed in the Year following, 1755; what number were taken off I know not, probably five hundred, which were ten Years on ſale; for a third Edition was publiſhed in 1765; which I preſume is not yet ſold off. Mr. Kirby was one of thoſe Favourites of Dame Fortune, who are more indebted for her Favours to Circumſtances, and a lucky chain of Events, than to real Merit. Although the Work publiſhed by Mr. Hamilton fifteen Years before his, was infinitely ſuperior, yet he was ſcarce known; that Work not being at all calculated for the ſtudy of thoſe who profeſſed themſelves Artiſts, nor do I ſuppoſe that he was any Artiſt himſelf, which Mr. Kirby had ſome pretenſions to; and being introduced to the Body of Artiſts, by the celebrated Mr. Hogarth, he was received by them, as a Perſon qualified to clear up the deep Myſtery of Perſpective, which was but little known amongſt them; and, in conſequence of his reading three Lectures to the Society, then lately founded, in St. Martin's Lane, they publiſhed the following Advertiſement. KIRBY'S PERSPECTIVE OF ARCHITECTURE, 1761.

Academy of Painting and Sculpture, in St. Martin's Lane: Jan. 24, 1754.

Mr. Kirby, author of a work, intituled, Dr. Brook Taylor's Method of Perſpective made eaſy, &c. has read three lectures (being the ſubſtance of his intended work) to the gentlemen of this Society, which appeared to them ſo clear, ſimple, and extenſive, that, in order to do juſtice to ſo excellent a Performance, they have unanimouſly given this their public approbation, and declared the ingenious author an honorary Member of their Body.

By Order, F. M. Newton, Secretary.

Being conſidered as the firſt who attempted to familiarize the new Principles of Perſpective, by Dr. Brook Taylor, and nothing better than the Jeſuit's being then extant, that is, known to them, it is no wonder that moſt of them became Subſcribers, and intereſted themſelves in the undertaking, (which was not very enormous; for I don't ſuppoſe the whole expence was above £.100); flattering themſelves, that they would now become Proficients, in what they thought eſſential to the Arts; and he was, luckily, ſo much an Artiſt himſelf, as to be utterly averſe to mathematical reaſoning on the Subject, and being maſter of ſo much Fineſſe, as not to pretend to more knowledge than they, was a means of ingratiating himſelf into

Joſhua Kirby.

favour amongſt them. As the World, in general, are influenced in ſuch matters, too much on credit, ſuch a public Manifeſto, of their Approbation, was greatly in his favour, and doubtleſs was of Service to the Publication. But a more fortunate Event was, that his Majeſty (then Prince of Wales) being a lover of the Arts, and fond of architectural Drawing, was deſirous of knowing ſomething of Perſpective. Mr. Kirby was propoſed, to teach him the Principles of the Art; by which fortunate Circumſtance, a foundation was laid for his future Fame.

Being thus introduced on the great Stage of the World, under the ſanction of the Society of Artiſts of Great Britain; obliged to Mr. Hogarth for bringing him out of Obſcurity, and holding him forth to public View, as the firſt Maſter of his Profeſſion; in which he made no inconſiderable Figure.

Elated with his great ſucceſs, he undoubtedly thought himſelf qualified for ſomething more capital than his firſt Production, which had already gone through two Editions. In ſuch a Station and conſpicuous Point of View as Mr. Kirby now ſhone in, there was great reaſon to expect ſomething extraordinary; no common Performance could now be diſpenſed with. The World was not long ignonorant that ſuch a Work was preparing, as would outdo every thing of the kind; when, lo! in 1761 appeared a Coloſſus indeed, of gigantic Stature, truly worthy of its great Author; adorned with Sculptures, by the moſt eminent Artiſts of the time, and dedicated, with great Pomp, (engraved on Copper) to the KING.

In the Preface, he gives us to underſtand, that he has treated the Subject in a manner entirely new (which is certainly true) and, in the Title Page, he ſays, by two Rules, only, of univerſal Application. "So great and expenſive an undertaking (he tells us) he ſhould by no means have attempted, had not a munificent HAND held forth its aſſiſtance, and enabled him to do, what, otherwiſe would have been impracticable. Under ſuch favourable and happy Circumſtances (he ſays) even the moſt indolent would be rouſed into Action, and the moſt unpromiſing genius might be inſpired; which, added to the ſolicitations of his Friends, and the reception his former Work had met with, he had certainly every poſſible inducement for exerting his utmoſt abilities, in the Service of the Public; and which, he avers, had more weight with him, than lucrative conſiderations."

Never Author had a fairer opportunity for diſplaying his Talents to the World; and therefore, as he ſays he has every inducement for exerting his utmoſt Abilities, we may be aſſured, that this Work was his utmoſt effort; for, although he has promiſed (conditionally) that this Volume ſhould be followed by another, I never yet heard that it had made its appearance, nor even attempted.

It was his misfortune, notwithſtanding all theſe favourable and flattering Circumſtances in his favour, to produce a pompous Nothing; not worthy of notice by thoſe who are underſtanding in the Science, or Art, only (for Science it contains none, of his own). Had he, indeed, done all that might have been expected, or he promiſed, there had been nothing left for me to do; ſo far I am obliged to him.

On a Survey of this Work, in which, from the pompous manner of its being uſhered into the World, one would expect to find ſomething very excellent, or at leaſt uſeful to the Arts; and ſo indeed we do, for it contains Engravings of great merit; but it is to be lamented that the Deſigns were not deſerving ſuch execution. In fact, the whole ſeems calculated more for Pomp and Show than real Uſe; for it is amongſt the laſt, of thoſe which treat on Perſpective, that I would recommend to the Public. In reſpect of its Title (the Perſpective of Architecture) I am ſorry the Author has not explained its meaning. Architecture being, here, in the Genitive Caſe, it implies, that Perſpective is ſomething derived from, or appertaining to Architecture; I never conceived that Architecture, in any wiſe included or comprehended the Science or Art of Perſpective. Architecture, itſelf, cannot be called a Science, but an Art, variable at diſcretion. Architecture is the Art of Building; even the Orders of the Grecians are not, in themſelves, Architecture, but decorations and embelliſhments of it, only; then, what affinity has Perſpective to Architecture? none at all, but that it is applicable to Architecture, perhaps better than to many other Subjects.

The

Joſhua Kirby.

The Work now before me, although ſo promiſing in Appearance, is but little known in the World, where it is ſuppoſed to be moſt neceſſary; for which reaſon, the Remarks which I am about to make will anſwer but little purpoſe; and therefore, ſhall be as brief as poſſible, and defer a more minute Inveſtigation to a more favourable opportunity, when more at leiſure for it. But if the ſame munificent Hand was held forth to defray the Expence (Society, at large, not being ſufficiently intereſted in it) there is matter for a large Volume, in order to explain, to correct, and to retrieve Perſpective from the Ignominy with which it is here treated; and which, was the danger as great to the Community as to the Arts, apparently, I ſhould purſue it with ſatisfaction; but, in many reſpects, it is ſo very inſignificant, as to be below notice, and unworthy of Criticiſm, had it not been uſhered into the World in ſo magnificent a Dreſs and Equipage.

Here is a curious Frontiſpiece, deſigned by Mr. Hogarth; but not in the ſame ludicrous ſtile as the former: It were to be wiſhed that he had explained its meaning; for, being ſymbolical, the meaning of it is not ſo obvious as the other. To me it conveys the Idea, which Milton, ſo poetically, deſcribes; of the Angel, Uriel, gliding down, to Paradiſe, on a Sun-Beam; but the young Gentleman has dropped off before he had arrived at his Journey's End, with Palladio's Book of Architecture on his Knees. A Ray of Light from the Sun, riſing, over a diſtant Mountain, is directed to a Scroll on the Ground, on which are two or three ſcraps of Perſpective; over which, ſupported by a large Block of Stone, is the upper part of a Scepter, broke off; the Shaft, very obliquely and abſurdly inclined, ſomewhat reſembling the Roman Faſcis, and girt, above, with the Prince of Wales's Coronet, as an Aſtragal; through which the Faſces riſe, and ſwell into a Crown, adorned with embroidered Stars; this is the principal Object, but moſt vilely drawn. The Ray paſſes through a round Temple, at a conſiderable diſtance, which is alſo falſly repreſented; the Curves being, for the diſtance, too round, and conſequently, the diminution of the Columns is too great. It appears to paſs over a piece of Water; on this Side, the Ground is fertile and luxuriant with Vegetation, abounding with Trees and Shrubs; on the other Side, it is rocky and barren. What is indicated by this ſeems to be, that, where the Arts are encouraged, by the Rays of Royal Favour, they will thrive and flouriſh; but where they are neglected, and do not find encouragement, they will droop and languiſh.

The firſt Part, containing 82 large, imperial Pages (the whole of which may, with much more propriety, be compriſed in half the number, octavo) is the deſcription and uſe of an Architectonic Sector, by Mr. Adams, of which there are two Plates, one of each Face; a Limb of a Circle (ſomewhat more than a third part) near 2¼ in width, the outer Curve 7 Inches Radius; with a Sector 12 Inches long, and two wide; through which, near the middle, the Arch paſſes. There are 23 Plates, ſhewing the Application of this Inſtrument, in proportioning the Orders and their ſeveral Parts, Impoſts, Doors, Entablatures for Doors, Conſoles, Balluſters, &c. for which, Mr. Adams is more obliged, than the Arts for his acquiſitions to Perſpective, the whole of which is compriſed in 24 Pages. I ſhall therefore paſs over this Part as ſo much waſte Paper (for I am of opinion, that the Inſtrument was never made ſo much uſe of ſince) being entirely foreign to the Subject of Perſpective, of which he propoſes to treat; and conſequently, ſuperfluous in it.

The ſecond Part, with the ſame Title Page as before, omiting the Title of each ſeparate Part, is thus entitled: "The Perſpective of Architecture, a Work entirely new; deduced from the Principles of Dr. Brook Taylor, and performed by two Rules only of univerſal Application. Begun by Command of his preſent Majeſty, when Prince of Wales. By Joſhua Kirby, Deſigner in Perſpective to his Majeſty. Volume the Second." By which, it ſeems to be intended as two Volumes, yet the firſt is wholly on Architecture, as performed by the Sector. Here is no Preface to this Part, but that which is to the firſt begins thus: "Whoever attempts to go out of the common road of ſcience, or to tread in any new and unbeaten path, muſt expect ſuch a ſcrutiny from the public, as is conſiſtent with the nature of his ſubject:

Joſhua Kirby.

ſubject: and however trivial their opinion may have been thought by ſelf-ſufficient writers, yet I have always eſteemed it the very beſt, if not the only criterion, by which a modeſt author would deſire to be tried." In this we have an oblique Complement to his own Modeſty. "All the figures, which are produced as general rules in this work, I have ventured to call my own." Although I ſhall not diſpute this Point with him, on the whole, yet is there nothing new or particular in them, being uſed not only by all the modern Writers, but alſo by the Antients. He then adds; "Now if any one ſhould ſay, that *my* rules (ſtrictly ſpeaking) may all be obtained from the ſtudy of Dr. Taylor, I would anſwer, that the ſame kind of remark will hold good againſt every mathematician, that has wrote ſince the time of Euclid. And I would at leaſt deſire him to conſider, whether the digeſting theorems into a regular order, deducing proper corollaries from them, and illuſtrating them by new ſchemes and examples, has not as juſt a claim to the title of original, as any thing that can be produced in an age like this, when almoſt every ſubject ſeems to be quite exhauſted." I ſhould imagine that this Paſſage alludes to his former Work, for here is no Science, as alluded to above, no Theorems or Corollaries deduced, in this Work, being wholly practical; and although he refers to the other, ſometimes, by Note, yet, in general, it ſeems as if he never had, or entirely forgot that he had, publiſhed any thing before, on the Subject, it is ſo far ſhort of what might be expected, ſeven Years after; ſo like the Production of a Perſon wholly ignorant of the ſcientific Part; for, what has any pretenſions to Science in it, he is indebted to Mr. Cowley for it, by way of Remarks; in which there is nothing, but a few Analogies of Proportion, ſome erroneous. I preſume he means by the words, in an Age *like this*, ſo barren of Men of Science, of Genius, and Letters; for, ſurely, he had no cauſe to complain of the times, as not properly rewarding, or giving due encouragement to Merit, where it ſhone ſo conſpicuous.

In what he calls an Introduction, we have theſe Words. "It ſhall be *our* buſineſs to ſtrike into a new path, and endeavour to eſtabliſh *ſuch* principles for this part of Perſpective as ſhall have a rational theory, and fully anſwer the end propoſed by them. In order to do which, *we* will begin in a regular manner, and go on ſtep by ſtep, till *we* have fully illuſtrated whatever *we* ſhall advance." The title of this ſecond Part, or Volume, is, A new Method of drawing the five Orders, elegant Structures, &c. in Perſpective. That the Method is new, may with truth be ſaid; but, *ſuch* a Method as, I am of opinion, none but himſelf ever practiced, or ever will, if they are acquainted with Perſpective, on true Principles; yet, allowing his *Method* to be new, he ſurely does not mean to inſinuate, that there is any thing new in the Principles of it, which he talks of eſtabliſhing on a *rational* Theory; he rather means without Theory, or Principle, like Sirigatti, whom he cenſures for his deficiency therein; but how much more is he cenſurable, for making ſuch a poor uſe of ſuch perfect and infallible Principles? one might be led to imagine, from this pompous Paſſage, that he had juſt refuted, and proved all former Principles to be erroneous, and was about to eſtabliſh new ones, on a *rational* Theory. Poor Gentleman; I am afraid that, being intoxicated with the Conſequence he now imagined to be veſted in him, the intenſe ſtudy, and labour of this aſtoniſhing Production, had ſhook, and ſomewhat impaired his upper Works; what a ſtyle is here to dictate in; ſuch as (though it might have become) is not to be equalled, by Brook Taylor, himſelf; who, as he truly ſays, finding the Elements and Principles of Perſpective, ſo narrow and contracted, he was obliged to throw aſide the old, and invent new Terms of Art, in order to enforce, and eſtabliſh his new Principles. But what has Mr. Kirby done? why he has, by his (Ignorance I cannot call it, but) Vanity, and Self-conceit, endeavoured to ſap the Foundation of thoſe excellent Principles, by aiming to level them to the Standard of his own Capacity; in treating ſo valuable, and uſeful (it may not be Preſumption to add) ſo noble a Science in ſuch a trifling, ſo puerile, and contemptible a manner, as he has done in this, his laſt Performance.

But, what muſt we think of Mr. Kirby's Underſtanding, who could attempt to draw ſuch a Parallel, and expoſe it to the Public's Eye; that the ſame Argu-

ment may be alledged againſt every Mathematician ſince Euclid, reſpecting the originality of *their* Works, as to *his* Rules, which may (*ſtrickly ſpeaking*) be all obtained from the ſtudy of Dr. Taylor? I am aſtoniſhed at the unparalleled Effrontery of ſuch Language? Does he not know that the Mathematics were in their very Infancy, in the Time of Euclid. In Aſtronomy they had ſome knowledge; but how contemptible the Ptolomaic Syſtem, compared with the Copernican, ſo infinitely ſuperior; every Appearance in the Heavens ſo rationally and clearly accounted for, that it may almoſt be called original, compared with the groſs abſurdities of the other. But, was Algebra, Logarithms, Fluctions, or even the Conic Sections. Trigonometry, and many other Sciences, ſo much as thought on in thoſe Days? Nay, allowing Euclid to have ſome knowledge in Optics; yet the many Branches, into which it has ſince ſhot out, as Dioptrics, Catoptrics, and, above all the reſt, *Perſpective*, was wholly unknown. And would he draw any Compariſon between the originality of *his* Rules as deduced from Dr. Taylor, and of thoſe Sciences, ſince the time of Euclid? what there is of original in them, I ſhall next enquire. Joſhua Kirby.

In the Introduction he ſays, that "the moſt general forms of architecture may be comprehended under the Triangle, the Square, and the Circle; and, All thoſe lines that are boundaries to the ſeveral parts of Architecture, are either ſtraight or circular." And again; "if the body of an edifice be a cube or parallelepipedon, its angles are right ones; if a priſm, its angles are acute; and if a poligon, then its angles are obtuſe." His Definitions, or rather the geneſis of theſe Solids (Def. 24) in his firſt Work (for he defines nothing here) are on a piece with theſe. In the firſt place, we are led to conceive, that a Cube is not a Parallelopiped, and that the Angles of a Parallelopiped are neceſſarily Right; 2ndly, we are to underſtand that the Angles of a Priſm are acute, as if neceſſarily ſo; 3rdly, that the Angles of a Poligon are obtuſe; not always ſo, unleſs regular. He does not ſeem to have any Idea that a Cube is a Parallelopiped, and a Square a Parallelogram; that all Parallelopipeds are Priſms, and that, whether they are right or acute angled; for he ſays (Def. 24) that "If a Line move uniformly about two angular Figures, &c. the Line by its motion ſhall deſcribe, if it has three Sides, a Priſm; if four, a Cube or Parallelogram" (meaning a Parallelopiped); whereas, if the four ſided Figure be a Trapezium, a Priſm will be generated, but not a Parallelopiped. This is almoſt the general Idea, that the Baſes of a Priſm are Triangles, only; but even in that caſe, there may be one right, or obtuſe Angle. A Priſm is generated as he deſcribes; for it is a Solid having, or contained between, two parallel, equal and ſimilar, right lined Figures, and as many more Planes as one of thoſe Figures has Sides, which are all Parallelograms. In this Definition of a Priſm (which is full, and perfect) it muſt be obvious that every ſpecies of Parallelopipeds is included, and conſequently, a Cube; for, if the two generating Figures are Parallelograms, of any ſpecies, the Solid, generated, is a Parallelopiped; conſequently, if they are Squares, and the generating Line be equal to a Side, and moves perpendicular, a Cube is generated, without any contradiction to the Definition given, of a Priſm. But I am led aſide, or diverted from the Subject, by this, not uſeleſs, Digreſſion.

"An order of architecture (as to its mouldings only) may be conſidered as a number of ſquare and circular horizontal planes, of different diameters, laid in ſuch a manner upon one another, as to give the peculiar ſhape or outline of each; and therefore to put the ſeveral mouldings into perſpective, nothing more ſeems neceſſary (as he ſays) than two general or univerſal rules; viz. one for drawing the repreſentation of a ſquare, and the other that of a circle; and theſe we have deduced from the principles of Dr. Brook Taylor."

An Order of Architecture conſiſts of a Column, or Pilaſter, with its Baſe and Capital (with or without a Pedeſtal) and an Entablature, conſiſting of an Architrave, Frieze, and Cornice; the Mouldings of which, he ſays, may be conſidered, as above. By ſquare Planes, laid horizontally one upon another, he muſt mean, only, an Entablature around a ſingle Column, or Pilaſter; the circular Planes are to be applied in forming circular Mouldings, for they muſt either be all Squares

Joſhua Kirby.

or all Circles. All regular Mouldings are compounded of plane and cylindrical Surfaces; in circular Mouldings, the Surfaces are, in ſome parts, a kind of parabolic Spheroid. And ſo, his two univerſal Rules are, ſimply, to put a Square and a Circle into Perſpective; what a wonderful diſcovery is here; and theſe, with great ſagacity and profound penetration, *we* have deduced from the Principles of Dr. Taylor. What had he to deduce, I wonder? was not the Square, put into Perſpective, in the very ſame manner, by the Jeſuits, yea by Vignola, and others before him, long before Dr. Taylor exiſted, or his Principles thought on? and for the Circle there was little to deduce. Now for the application of his general Rules.

The firſt Section begins with obſervations on the works of Nature; that the forms of ſome Objects pleaſe every Eye, whilſt others create diſguſt; that he ſhall not take upon him to determine from what cauſe this ariſes, which had employed the Pens of ſome learned and ingenious Men, but that none had ſucceeded in the attempt equal to his very worthy and ingenious friend, Mr. Hogarth, in his Analiſis of Beauty, and that it would be preſumption in *him* to attempt it, after him; however, in drawing the perſpective repreſentations of Objects, the utmoſt care ſhould be taken to avoid diſagreeable and unnatural Forms; yet, excepting Plates 36 and 37, 50, 55, 63, 70, and 73, there are nothing but diſagreeable and unnatural forms in the whole Book; not that theſe are altogether agreeable, yet they do not diſguſt, although ſome of them offend the Eye.

The Definitions which Mr. Kirby has heretofore given of Perſpective is, to repreſent Objects as they appear to the Eye; which opinion, though falſe, he is, at all times, ſtrenuous to ſupport. Is it not, then, ſtrange, that almoſt every Object, in this Work, is delineated in ſuch a manner, as is repugnant to thoſe tenets? for ſurely, when two Faces of a right-angled Solid, of any kind, are ſeen, and almoſt equally oppoſed to the Eye, there can be no reaſon given, why the horizontal Lines, ſhould be repreſented by parallel Lines, in one Face, more than the other; for either may, yet be true Perſpective; but, although he has given all the Orders, and moſt of the other Objects in this oblique and abſurd poſition, he could not imagine that the Objects themſelves, appear ſo, to the Eye; for they do not, but appear to decline, on each ſide, according to the obliquity of the Faces to ſight. See this matter clearly diſcuſſed, in the 9th Sect. of the Treatiſe, Book III. P. 198. Pl. 23.

"In order to do which, we muſt fix upon a proper diſtance and height for the Eye, for if the diſtance be too ſmall, the apparent lengths will be too long; and the contrary when the diſtance is too great." What can he mean by the *apparent* lengths? of what? for it relates to nothing preceding this Sentence; by apparent, he means repreſentative lengths; and, I ſuppoſe, he means of Lines receding directly from the Picture, on the Ground; but what ſignifies the appearance of thoſe Lines, when a Solid is repreſented, whoſe upright Faces hide them.

"It would be very difficult, if not impoſſible, to aſſign one determinate diſtance to be univerſally made uſe of; or ſuch a one as ſhould anſwer on all occaſions; becauſe the different circumſtances *relating to pictures*, will frequently render a rule of this kind abſolutely impracticable. This is a truth known to every artiſt, that has had much practice in the *ſcience* of perſpective; and ſuch I would aſk, whether experience is not the moſt certain, or at leaſt, the moſt *ready* and *convenient* guide in this caſe?" What theſe circumſtances are, I muſt own I am not clear in; the abſurdity of the Expreſſion, and of the remainder of the Sentence, are ſo very glaring, as renders a Comment on it unneceſſary.

We are told to divide the height of the Picture into three equal parts, and through the loweſt diviſion to draw the Horizontal Line; which being divided into two equal parts, the point of biſection is to be called the Center of the Picture; which ſhould always if poſſible (he ſays) be in the middle of the horizontal line, meaning the Picture (reſpecting the length) but, that a deviation is ſometimes unavoidable; and which he has avoided, almoſt generally, in this Work. Then, the utmoſt width of the Picture, being taken, is ſet off, from the Center, on both ſides, in the horizontal Line, which are called the Points of diſtance; and then he ſays; "Now this is all that is previouſly neceſſary for an explanation of the following

lowing ſchemes, which I call univerſal rules for drawing the true perſpective repreſentation of any buildings," &c. and this is all the preparation he makes, and all the Definitions that are given, in the Book; after which, follow four, more, general Rules, in order to the application of the former two. Joſhua Kirby.

The firſt is, to draw the repreſentation of a Line parallel to the horizontal Line, and to divide it into any number of equal or unequal parts. The ſecond is, to do the ſame when the original Line vaniſhes into the center of the picture; the third, when it vaniſhes into the points of diſtance; after which he ſays, "It is preſumed, that theſe three rules only will be ſufficient for the reducing almoſt every regular piece of architecture into perſpective, and in a greater variety of ſituations than has *hitherto* been attempted." Was ever any thing equal to this Preſumption; or, ſhall I call it, Ignorance? for if he but imagined what is here aſſerted, he was ignorant indeed; ſeeing that, the three Rules, as he calls them, had been practiſed above two hundred Years. "The firſt rule is adapted to the ſides of ſuch buildings as directly front, or are even with the Eye; the ſecond to thoſe that run directly from the Eye; and the third to ſuch as are viewed angle-ways, ſo that both ſides have an equal degree of obliquity." *

After theſe three extaordinary Rules, he ſays; "But to make this work as univerſal as poſſible, I will add a fourth rule, which may occaſionally be wanted, and which being infinite in its application (I am ſpeaking of *ſquare* buildings only) will anſwer for every degree of obliquity that can be propoſed; however this needs not at preſent to be attended to, being of no uſe in this volume. Having given ab for the bottom of one ſide of any ſquare building, to find the vaniſhing points of both ſides, and alſo the points for cuting off," &c.

The Introduction ends with theſe words; "however, this, in order to make the work yet more complete, ſhall be followed by another volume, if we are ſo fortunate as to meet with the public approbation." As this fourth Rule is made no uſe of, in this Work, as above, it ſeems as if he reſerved the application of it for the propoſed Volume; ſo that, owing to the Public's ill-timed parſimony, or want of diſcernment, in not ſeeing the *great* merit of this Performance, a Treaſure, of unknown value, is loſt to Poſterity, alas! for ever; a loſs, which Time cannot repair.

In ſpeaking of the great inconveniency ariſing from diſtant Vaniſhing Points, he ſays; "this inconvenience may indeed be ſomewhat removed, by analogical proportion†; but even here the remedy will be almoſt as bad as the diſeaſe; the ſhorteſt method ſeems to be that of making a ſmall model, truly drawn upon paper, and then to transfer the ſeveral parts of this model to the picture, by the common method of reticulation or net-work." This muſt needs be a very correct method (to wave the loſs of time, in drawing the Model) firſt, to be done in miniature, and from that, to draw it at large. A long Ruler may be procured, at a ſmall expence, and all this imaginary difficulty obviated; which, of all other, is the beſt Expedient.

He now applies his two general Rules to Squares, parallel and inclined to the Picture (according to the three firſt, of the laſt four) and to Circles; then to Cubes and Cylinders, and alſo to a Globe. He ſays; "Mouldings may be conceived to be made up of many ſquare and circular horizontal planes, like thin paſteboards of different widths, cut out, and laid upon one another, ſo as to give the peculiar form or ſhape of each moulding," &c. and ſo, by the prolix method of finding the

* Here, he pays himſelf a Complement, at his Reader's expence, by a Note; the ſubſtance of it is, Unleſs the reader perfectly underſtands theſe general Rules, he may find difficulty in comprehending their various applications, in the following Examples. But, had he made his Rules more general, and expreſſed himſelf in proper Terms, the difficulty of comprehending it had been removed. The firſt comprehends *all* Lines which are parallel to the Picture, and is applicable to every Line in the Faces of Objects which are parallel to it; which is more expreſſive of what is meant, than thoſe *ſides* which are *even* with the Eye. The ſecond is applicable to all Lines perpendicular to the Picture, whether they are in the Sides of Buildings which *run directly from the Eye*, or in any Plane that is perpendicular to the Picture; and the third, to all Lines which are inclined to the Picture in an Angle of 45 degrees, let them be in what Plane ſoever, knowing where to place the Points of Diſtance.

† It is not eaſily determinable, what he means by analogical Proportion; for, without Analogy there are not Proportionals. Analogy and Proportion, are almoſt ſynonimous.

repre-

Joſhua Kirby.

repreſentations of a number of Squares of different Diameters, as many Points are obtained in the Curve, in order to deſcribe it; and this is all that is effected by it. The ſame is applied to the Ovolo of a Tuſcan Capital, and alſo to a Globe; for deſcribing which, in the 8th Plate, he has nine Circles, drawn horizontally, and then deſcribes a Curve over their extremes; which certainly, being truly drawn (but that is ſcarce poſſible) would give the apparent contour of a Sphere; but, the proceſs is not only very liable to error, but is alſo moſt operoſe, compared with the method I have exhibited, in Fig. 11. Plate 9. in which, as many Sections may be taken (at diſcretion) as are neceſſary, and deſcribed with Compaſſes, and which, may be depended on; the other, being all Ellipſes, very excentric, and deſcribed by hand, cannot. This he gives, for the perſpective repreſentation of a Globe, which is an Ellipſis, and performed on his own, *rational* Principles; or rather, it is the Principle itſelf, on which he proceeds, for round Mouldings; yet, in his former Work, Page 72. "ſuch repreſentations, not being in the Eye's Axis (i. e. in the Center of the Picture, he ſays) ſhade them how you will they can never appear like Globes to any common Spectator; becauſe it is contradictory to the Idea in general formed of rotundity;" and I affirm that they cannot appear like Globes if not ſo repreſented; for, being round, they would appear elliptical, though ever ſo truly ſhaded; but let them appear like Globes, or Spheroids, the Idea of *rotundity* is ſtill the ſame.

He now proceeds, in Book II. to the Delineation of the Tuſcan Order, one ſeen direct, another in the moſt common, though abſurd, poſition, uſually called an oblique front View; which means, that one face is parallel to the Picture, the other, which is ſeen obliquely, is neceſſarily perpendicular to it. His method of proceeding is by ſuppoſing a ſection down the middle, i. e. through the Axis of the Column, parallel to the Picture; in which, the extremes of his imaginary horizontal Sections, or Planes, which conſtitute the Mouldings, are marked with Aſteriſks; a moſt ridiculous and unneceſſary preparation, in many caſes, impracticable.

After the ſame manner, he proceeds through the five Orders, giving an Outline and a finiſhed Plate of each; all in the ſame abſurd poſition, without the leaſt variety, a Pedeſtal with the Baſe, and an Entablature, with the Capital of the Column, in each Plate; the Eye being elevated conſiderably above the Pedeſtal, gives it an aukward appearance; all are ſeen on the ſame ſide, and all are equally ſeen; ſo that, the delineation of one Order, with the decorations of the other, had been ſufficient. But, for what purpoſe he has given the Outline, to every one, is not evident; ſeeing that, he does nothing towards the Proceſs but ſet up the heights of the Mouldings, on the central Line; and, in one or two, he marks the extreme projectures of ſome of the Mouldings. However, to do him juſtice, in the 25th Plate, his method for determining the Abacus, and the Volute of the modern Ionic Capital (for this poſition) is judicious and well deviſed; nor do I remember to have ſeen it ſo done, in any other antecedent Work; for the proceſs of which, he has no leſs than eight Figures (three or four had been ſufficient) with a finiſhed one. The Corinthian Capital is not well drawn, reſpecting the Volutes and Cauliculas; but the Heads of the Leaves are vile; for, although ſix of the upper tier are ſeen, and the Eye ſo much below them, yet, the two laſt turn their fronts towards us, inſtead of being ſeen underneath, and the ſtalks are as if in profile. In projecting Mouldings, he never attempts to find the Diagonal, or mitre Angle; but, from the height and center of each Square, on the Axis, which is a trifling and round about method, and very liable to error, the whole is determined; and which, being deduced from a much better method, viz. making a geometrical profile of the Mouldings, with diagonal Lines (as in the Jeſuit's) he calls a Method *entirely new*; for which he is ſo vain, as to arrogate to himſelf the ſole merit; I am of opinion, that none has ever thought it worth attempting to rob him of it.

But, how he would have applied this new method of his to Mouldings, when they are inclined to the Picture, I am at a loſs to deviſe; as the third Rule, for Lines which vaniſh in the Points of Diſtance, is never once applied to Mouldings, in this Work; therefore, is of no more uſe in it than the fourth. What a mis-

fortune it is, to the preſent Age, that he had not the Public's approbation of this, that he might have favoured the World with what would have rendered the Work complete and perfect; what blindneſs to ſuch exalted Merit, what a loſs to the Public, never to be repaired. Joſhua Kirby.

The third Book he calls, General Rules for determining the perſpective of Shadows, which I have attentively examined; and, except in reſpect of Arches and Niches, in which the Shadows are truly projected, and one on Mouldings, find nothing but common-place Subjects; the Shadows being projected either on the Ground, or on Planes parallel and perpendicular to the Picture, the Objects being parallel or perpendicular to them alſo; with four, ſimple Subjects, on cylindrical Surfaces. In the third Obſervation on the firſt Example, viz. when the Light is vertical on the Picture; or, as he expreſſes it, "When the Shadow vaniſhes into the center of the picture, as in this figure;" he ſays, "then the light comes from directly before the picture; and then the ſides or parts of objects, which tend to the center C will be enlightened; but the front ſides will be the lighteſt."

The meaning of this abſurd and ſtrangely expreſſed Sentence is, that when the Sun (for, by Light, he means that Luminary) or rather the Picture is ſo ſituated that a vertical Plane paſſing through the center of the Sun, is perpendicular to the Picture, that Planes perpendicular to the Picture and to the Horizon will be illumined, but that the front Faces, being parallel to the Picture, will be moſt illumined. Now, the Light being ſuppoſed in the ſituation, reſpecting the Picture, as above, and being, to ſenſe, at an infinite diſtance, it is conſequently, at the ſame time, in every Plane parallel to the ſuppoſed Plane; therefore they are not at all illumined; but are as entirely deprived of Light, as if it was on the other ſide; perhaps more ſo, as they receive leſs from Reflection; whilſt the front Faces are as fully illumined as poſſible, in the given altitude of the Luminary; therefore there is no compariſon can be made between them. In Plate 40, Fig. 2, is a curious Example of the Luminary being in certain Planes, which are parallel to the Picture, yet a ſtrong Shadow is caſt on them, from adjoining Objects.

Although his Shadows are, in general, truly projected, yet are they as abſurd in ſome other reſpects as poſſible; as for inſtance. It is almoſt univerſally known, that the Shadow is darker than the Object which cauſes it, when adjoining to it; and although he practiſes this on vertical Planes, yet on the Ground it is always lighter than the Object; but in Plate 44, the Object which cauſes the Shadow is, in reſpect of the Shadow, in full Light, the contraſt is ſo ſtrong; and the gradation of Shade is ridiculouſly abſurd, in general, on his Objects. In his Shadows of the Pedeſtals, caſt on the Ground, the Shadow begins with a ſtrong edge of Shade, which, before it reaches the width of the Pedeſtal, is Light, in reſpect of the Plinth, which is alſo gradated. In reſpect of Columns, he contradicts the former aſſertion; for he ſays, Ex. 19. P. 34. Obſ. 2. "this point of contact will always be the darkeſt part of the Shadow," meaning the Line of contact with a Plane paſſing through the Luminary. In another place, he ſays, that it will gradate from that point, both ways; on one ſide into the Light, on the other into the Reflection.

In Plate 38 is a Nich, which he ſays is properly ſhaded; yet, in the Head, where the Shadow begins, the contraſt is as ſtrong as elſewhere; one ſide being fully illumined, the other in full Shade, which, in Nature, is ſcarce diſtinguiſhable; at the edge it is not, owing to the concavity of the Head. On the ſhaded ſide, the teint is uniform; from the part of the Head, which is nearly horizontal, to the bottom, the whole appearing as a Plane; the Light being the ſame on the oppoſite ſide. There are many Abſurdities in this Chapter, but theſe are the chief.

The fourth, and laſt Book begins thus; "Before I begin with this part of perſpective (of Buildings in general) it will be neceſſary to conſider the apparent ſize of the trunks of columns that are placed parallel to the plane of the picture.—— What I am going to advance upon this ſingular part of perſpective, is not with any intention to revive a former controverſy about it, but only to offer ſome farther reaſons why columns, that are thus ſituated, ſhould be all drawn of the ſame ſize; and to give an univerſal rule for this purpoſe.—My continuing of the ſame opinion

Joſhua Kirby. as formerly, as to this matter, is not owing to obſtinacy, or ſingularity, but becauſe the evidence of my own ſenſes, a candid examination, and the experience of eminent artiſts, have all united to confirm it.—Every author ſhould write with candour and impartiality; and though he may not peremptorily determine in ſome diſputable caſes, he may, however, lend his aſſiſting hand towards clearing up that ſide of the queſtion, which beſt agrees with his own opinion."

His continuing ſeven years, or more, in an opinion the moſt abſurd, which, at that time had been ſo much controverted, if it be not a proof of Obſtinacy, it is a remarkable one of his Ignorance. The opinion and experience of the moſt eminent Artiſts, in this *part* of Perſpective, amount to nothing; for neither Experience, nor the evidence of Senſe, can determine in it. It is not the apparent ſize of the Columns that is in debate, but their repreſentative Diameters on the Picture; and the reaſons which he propoſes, here, to advance, are not *founded* in reaſon, and therefore have no weight. The Scheme, which he ſays he has invented, (Pl. 45. Fig. 1, and 2.) for obtaining ſuch a Diameter to work with, as will occaſion their being all of the ſame ſize, or nearly ſo, is abſurd; what need was there for a Scheme? they may be made equal without it. But, being made equal is not as they appear; how then does he reconcile that to his reaſons? yet he makes them larger; why not, then, of the dimenſions which Perſpective determines? we are not obliged to uſe ſuch a Diſtance as will, unavoidably, render them prepoſterous.

Plate X. Although I have, I preſume, ſet this matter in a clear light, as obſerved in Page 103. yet his Scheme, here given, is ſo very extraordinary, as obliges me to

Fig. 30. give it a place in this Work. (See Fig. 30. Pl. X.) AB and CD are the Plans of two Columns, and E the place of the Eye; AG is the Picture, which, though it illuſtrates the ſame, is abſurdly drawn through the centers of the Columns; the Viſual Rays, EA, EB, &c. being drawn, give the Angles AEB, CED, under which the Columns are reſpectively ſeen; and conſequently, the Column X, being fartheſt from the Eye, ſubtends the leaſt Angle, which the Arc A*cd* evinces. He juſtly obſerves, that the Eye refers to a Picture at the ſame diſtance, in both caſes, whether we look at one Column or the other; that is, in other words, to a ſpherical Picture, the Eye being in its Center; or, as if reſpects the Diameter of the Columns, only, to a concave Cylinder; in which caſe, the part *cd*, intercepted between the Viſual Rays EC, ED, which is the apparent Diameter of the Column X, compared with AB, is alſo its repreſentative Diameter, on that Picture. But, the Picture is a Plane, on AG, on which the Columns are repreſented, and CD, on that Picture, appears, to the Eye at E, equal to *cd* on the Cylinder; which is obvious, being ſeen under the ſame Angle, and by the ſame Viſual Rays. How, then, is it poſſible, that *cd*, being tranſpoſed to C*D*, could affect the Eye, as a Column of the magnitude, or Diameter CD, on that Picture, and in that Place; the dotted Line E*D* evinces that it could not, the Angle CE*D* being leſs than the Column ſubtends; conſequently, it would ſuggeſt an Idea of a Column, in that place, leſs in Diameter than AB, which is known to be equal.

Now, the Rule he preſcribes, is to draw cd parallel to the Picture, and take the meaſure cd for the Diameter of the Column, at CD; when, after ſaying a great deal, to little purpoſe, he adds, "From hence I would infer, that the Line cd does meaſure (very nearly) the true apparent magnitude of the Column CD, and therefore the picture ſhould be referred to that place; for, being parallel to CD it will cut the rays in cd, and therefore cd will very nearly determine the ſize which the column ought to be made of upon the picture," &c.—"Thoſe therefore, who will embrace this opinion, and would draw columns thus ſituated, ſo as to make them all of the ſame ſize in perſpective, have this as an univerſal rule for doing it; and thoſe who ſhall differ, &c. will be referred to a former rule."

Was ever any thing more abſurd, than to take cd, at that diſtance, and transfer it to C*D* at a greater, in order to give an Idea of the ſame magnitude? Is it not obvious, that cd appears equal to CD, to the Eye at E? but, being moved, to C*D*, it muſt neceſſarily appear leſs, becauſe it *is* leſs, than CD. Suppoſe another Column be added, as Z; is it not evident, that the repreſentative Diameter, FG, muſt

neceſſarily

neceſſarily be larger than CD, in order that it may appear, to the Eye at E, to be equal? or, rather, to give an Idea of equality; and, although the Eye may refer FG to fg, or rather to *fg*, yet ſurely, FH, being made equal to fg, cannot be referred to fg, under the optic Angle FEH, ſo as to be equal to fg, but only to fh. Yet, by his Rule, we are to make the Column at X equal to cd, and that at Z, to fg; but why not rather to *cd* and *fg*, which are their true apparent Diameters? or why all this preparation, if they are to be made equal? for it is not an Approximate, as he calls it, but is really equal, which is demonſtrable; ſo that, he has all this while been contriving and enforcing a Rule, only to make them equal, after all. Yet, he is ſo jealous that he ſhould not have the credit due to the Invention, that he informs us (by Note) that, ſince the Scheme was engraved, he has been informed, that one of the ſame nature was invented, ſome time ago, by Mr. Wright, an ingenious mathematician, which he aſſures us he never ſaw nor received any inſtructions from; ſo that, without the imputation of plagiariſm, the Invention may be called his own; I give him full credit for it. Joſhua Kirby.

After all this parade, preparatory to the application of the foregoing to regular Buildings, what has he done? or what ſatisfaction is derived from it, to thoſe who have not penetration enough to ſee the falſity and abſurdity of it? thoſe who have, will treat it with contempt, as it juſtly deſerves; he concludes his ſagacious and moſt extraordinary Remarks, thus. "That I might cut off all occaſion for controverſy, theſe two methods are offered for drawing the trunks of columns; and I would not, on any account, peremptorily obtrude my own opinion upon others, but only offer my own ſentiments in a diſputable caſe: and I here declare alſo, that I ſhall not think myſelf obliged to give an anſwer to any remarks which may be made, upon what is here advanced: the opinion of candid and ſenſible perſons will be thankfully attended to; but the ſtrictures of ſnarling and malevolent critics will be entirely diſregarded." Here he ſhuts the Door full in the face of Conviction; thoſe who either are of the ſame, or chooſe to humour him in his abſurd, and truly ridiculous opinion (none of Judgment can be ſo) are candid and ſenſible; whilſt all who ſee the abſurdity of it, and ſupport their Opinion, or rather, their Conviction of the truth, by ſolid Argument, founded in reaſon and demonſtration, would be deemed ſnarling and malevolent Critics. But, I would obſerve, to thoſe who are Advocates for, and ſupporters of his extraordinary Hypotheſis, that it is not the ſituation of the Columns, but of the Picture, which occaſions this, to many, unaccountable Paradox; for, let the Columns remain, and the Station the ſame, the Picture being properly ſituated (as Ag) the Paradox ceaſes; for the Columns will then be repreſented leſs and leſs, as they recede from the Eye, as they appear to be, both in height and width; and not larger in Diameter, though of equal height, as on AG. Which poſition of the Picture to the Columns, rather than the ſituation of the Eye in reſpect of them, he calls *even*, or *parallel* with the eye, a moſt abſurd and unmeaning Expreſſion; for, the Eye being conſidered, ſimply, as a Point, can have no variety of poſition, nor be parallel to any thing; and, however Columns are ſituated, in reſpect of the Eye, being diſtinctly ſeen, it is ſtill the ſame.

Having remarked, ſo largely, on this wonderful Paradox, which he aims at reconciling to his own abſurd opinion, as neceſſary to the ſubſequent Subjects, in which it is to be a leading Principle, it is needleſs, nor can I, at this time, enter on a further Inveſtigation; yet, I cannot paſs over an extraordinary Paſſage, in the ſecond Chapter, unnoticed; as it will plainly ſhew the pitiful Dilemma he is reduced to, by the application of his general Rule, to a tuſcan Colonade. Finding that the Entablature, which is parallel to the Picture, and conſequently has its geometrical proportion, on account of the reduction of the Columns, neceſſarily projects too much; or, as it is phraſed, over-hangs the Column, he has this Paragraph. "Here I am aware of an objection which may be made, on account of the extraordinary projections of both the upper and lower cincture, which will neceſſarily follow, from working with a leſs, inſtead of the real diameter of the column; but he muſt have a *bad* hand indeed, who cannot adjuſt the drawing *by his eye*, ſo as to give it an eaſy and natural appearance.

After

Joſhua Kirby. After ſuch Paſſages as this, and others which I have not only truly cited, but given the fulleſt latitude to his meaning, which is frequently couched under ambiguous terms and phraſes, I preſume, none can ſay that I have been uncandid, or accuſe me of too much ſeverity in my Remarks on this Work; in which I have not ſtudied how to wreſt his meaning, but taken the various Subjects, regularly as they occur, and fairly given the true meaning to ſuch paſſages, as are not only ambiguous, but ſometimes almoſt, if not quite unintelligible.

Here follows a piece of Doric Architecture, a double Portico, if the Niches were Doors; as it is, I know not what to call it. After which, is a kind of triumphal Arch (Doric) to the memory of Brook Taylor, LL.D. with a Statue on a round Pedeſtal, under the Arch; which is covered with a Pediment, ſupported by two attached Columns, on each Side; the Deſign is ſimple, and without elegance. A plain, heavy Building follows, forming an internal Angle; on the parallel Face, the projecting Cornice caſts a Shadow, which is falſely projected; an internal angle being formed, on a Plane, by the Shadow of a right Line. Next, is a heavy, lumbering, ſquare Building; after which follows another, the Banqueting-houſe, Whitehall; the Fronts, being parallel, ſo ſituated as to ſee an End, or other Face, conſiderably; which, being unnatural, always offends the Eye, giving the Object a heavy appearance. A Deſign for a Gentleman's Houſe follows, with two Wings, as high as the main Building; attached to it by ſtreight Colonades, of two Doric Columns each; the Entablature, of which, runs around the whole; a ſecond Order (the Ionic) ſupports a Pediment, extending the whole length of the Front; not a bad Deſign on the whole. There are ſome few other, heavy Objects; and in Plate 70 is a round Temple (of Victory in Kew Garden) having a circular Colonade, of twelve Ionic Columns, quite around; the middle Cylinder riſes above the Colonade, enriched with Feſtoons, a Cornice at the top, and covered with a Dome. This Plate is finely engraved, and is the moſt pleaſing Object in the Book. Plate 73, the laſt, is an elegant, or, as he calls it, a moſt magnificent Deſign, which was made and given him for the Work; and which, he adds, would make an excellent piece of Scenery. I know not what to call it; the whole Deſign would conſiſt of two ſquare Temples, or Pavillions (a Cylinder riſing above it, covered with a Dome) joined by a circular Colonade, with an Arch, and a Pediment, in the middle; but it has no connection with, as an entrance to the Pavillions. The whole is of the Corinthian Order with its Pedeſtal, and a Balluſtrade on the Entablature; which is a pleaſing piece of Architecture.

There is an Outline to each Plate, ſome of them to little purpoſe. The two laſt, and moſt of the beſt Plates, were engraved by Walker, others by Patton, one by Baſire; thoſe of leſs Note by Ryland, Fougeron, and Mazel; with two or three neat Etchings, by Kirby, junior. In the laſt page, I find that the loſs to the Public is much greater than I conjectured; for we are here told, that the propoſed ſecond Volume was to contain not meerly Buildings obliquely ſituated, to the Picture; but the Perſpective of Domes, and Cielings, of Scenes for Theatres, &c. &c. all which, he ſays, ſhould be fully explained and illuſtrated by thoſe *new* Principles, before the whole of Perſpective (as it relates to the imitative arts only) can be properly compleated. It was to contain alſo, ſome of the antient Temples and other Buildings of antiquity, and a few of the moſt elegant modern Structures, which would (he ſays) make an uſeful performance. But, before he ventures on ſuch an arduous and expenſive undertaking, it was neceſſary to ſee whether this part be worthy of public regard.

Some Notes, by Mr. Cowley, take up near two Pages, the 2nd and 3rd, which, on account of ſome unmeaning Paſſages and falſe Analogies, demand my attention. Firſt he ſays, "The variety of poſitions which the Eye may aſſume is a circumſtance peculiar to perſpective repreſentations." The Eye, being conſidered, ſimply, as a Point, can have *no* variety of poſition to any thing; Situation and Diſtance, can only be attributed to it. I ſhould ſuppoſe he meant Situation, had he not, in the next ſentence, made a diſtinct obſervation reſpecting its Place.

Further

Further on, he ſays; "When the Eye is conceived to be only 90 degrees diſtant from the plane of projection, or in the Pole thereof, &c." I have no conception of the Pole of a Plane, or when the Eye may be ſaid to be 90 degrees diſtant from it, unleſs it be a Circle.—"Hence it appears, that, generally ſpeaking, there are only four varieties in the poſitions that may be aſſigned to the Eye," &c. all which (Situations) relate to the projection of the Sphere only, and are to no purpoſe in perſpective Projections. Joſhua Kirby.

He gives one Problem, viz. "A Plane being given, the *poſition* of a Point, out of the plane, and the place of the Eye being given, to find upon that Plane the apparent *poſition* of the given Point." Its Image or repreſentative place is meant. After which is an Example, with ſome Analogies deduced from a conſtruction of the elementary Planes, tending to demonſtrate the truth of the Operations in the four Rules, concerning the various poſitions of Lines to the Picture. A Pyramid of Rays being imagined, from a rectangular Baſe, parallel to the Picture; from which, after two or three other, he frames theſe Analogies. EQ: YQ:: RQ: rC, or as SY: sy. EQ is the diſtance of the Baſe, or height of the Pyramid, RQ and SY are oppoſite Sides of the Baſe, and rC, sy, are their repreſentations, by the ſection of the Picture; YQ is another Side, ſo that it ſtands thus; as the height of the Pyramid is to a Side of its Baſe, ſo is a contiguous Side to its correſponding Side of the leſſer Pyramid, made by the Section. It might, indeed, be ſo conſtructed, but that is not the caſe, nor meant to be ſo here; but, that the Analogy is general, in every ſection parallel to the Baſe. It ſhould be, EQ: YQ or RQ:: EC: yC or rC; i. e. as the diſtance of the Baſe is to a Side, of the whole Pyramid, ſo is the diſtance of the Picture (C is its Center) to the repreſentation of that Side. How (if Mr. Kirby knew no better) Mr. Cowley could overlook ſuch a miſtake, in the Analogy, in ſuch a Work, is ſurprizing; from which, two Rules following, are intended to be deduced, for determining the diſtance of a Point, projected on the Picture, from the Horizontal and Vertical Lines. After which, he gives an Example, applying the Analogies to Lines parallel, perpendicular, and inclined to the Ground Line; which, beſides determining the Analogies of a right angled Triangle, reſpecting Vaniſhing Points, is all the Theory given in this Work; excepting two Notes, for determining, by Trigonometry, the length of the Shadow of a Perpendicular, to the Horizon.

In a Work like this, in which, no expence has been ſpared to make it pompous, one would imagine that the utmoſt attention would have been given to the reviſal of the Preſs, and every error of the Preſs carefully corrected; yet, beſides theſe, there are many falſe References, and many Letters wanting, which are referred to; and the operative Lines frequently omitted, or broke off unneceſſarily, without the leaſt apparent reaſon for it. It is an unmeaning and very unfair method of treating the Subject, by pretending to do with few Lines; which, in my opinion, rather perplexes than otherwiſe; for, is it not better to ſee the Line drawn, by which, any other Line is cut, than to break it twice, frequently? ſo that, it is not ſo diſtinguiſhable; but, wherever a Ruler is applied, the Line may be ſuppoſed to be drawn, in the Diagram, though there is not occaſion to do ſo, in Practice, but only to mark the Line which is intended to be cut by it.

If the Merit of this Author may be judged of, by the ſucceſs his firſt Work met with, it muſt be conſiderable; but 'tis lodged ſo very obſcurely, that I can diſcover but little of it. A ſecond Edition followed immediately after the firſt, in conſequence (he ſays) of the number of Subſcribers (about 250). A third Edition was publiſhed in 1765, with folio Plates, to a quarto Page; and in 1768, it was printed on imperial Paper, with the ſame Plates, in number 35; which, though twice the ſize, contain the ſame petit Schemes as the quarto Edition, with a few additional ones, of very little more conſequence, but ſomewhat more ornamental, and better engraved; with ſix ſmall Landſcapes, and two neat Views, meerly for ſhow, being of no real uſe in the Work. This Work is ſold by Mr. Taylor, in Holbourn, at the ſmall Price of £. 1. 4s in Sheets, and for 30 Shillings bound.

JOSEPH HIGHMORE, 1763.

THIS Work is entitled, The Practice of Perſpective, on the Principles of Dr. Brook Taylor; but, the whole of the two firſt Sections, or Chapters, is a Parallel of various old Authors, viz. Sirigatti, Pozzo, and Boſſe; whoſe Method (See Sect. 1. P. 16.) is now ſo very obſolete, that I cannot conceive why he has plagued himſelf ſo much, and his Readers, with it; yet he knows not when to have done with him, but is very ſolicitous to ſhew, how much more excellent and preferable is the new method, by Brook Taylor, compared with his; in which no Compariſon can be made, nor was it fit to bring him in competition. Although throughout the whole, he ſeems to be converſant in Geometry, yet he has not given any Theory, whereby to enforce his Rules, in Practice. It is perhaps, tho' ſomewhat maſterly, the worſt digeſted of any extant, for conveying Inſtructions; he has not even defined the Terms, with any propriety, neither does he give any Figure to ſhew the Rationale, or ſo much as mentions it, before the laſt Section, giving an Idea of ſeeing Objects through a tranſparent Plane; a thing ſo eſſential, that I ſcarce know any other Author who has omitted it. His introductory Leſſons are few and trifling, and thoſe chiefly from the old Authors; he has but five or ſix Leſſons in Lines and Figures, before he leads us to Solids, and begins with a Tuſcan Pedeſtal, inſtead of plane Solids.

Like his Predeceſſor, Mr. Kirby (though his Work is much more maſterly; and, as he ſays, the firſt wrote, after Brook Taylor) he has omitted ſeveral Lines which he refers to, and were neceſſary to be drawn, nor would they either deface or encumber his Figure. This is a piece of Art which Kirby uſually practiſes, in order to ſave the appearance of Confuſion; he alſo, frequently, breaks his Lines unneceſſarily, to avoid croſſing his Diagrams, whilſt the Diagrams of thoſe they compare with, are crowded with unneceſſary Lines, more than the Authors of them ever made uſe of, and all drawn at the ſame time.

He is alſo extremely irregular in his References, making uſe of large and ſmall Letters, Roman and Italics, promiſcuouſly and unneceſſarily; he often refers to Roman Letters by Italics, and to Italics by Roman; and, what is, to me, moſt diſagreeable, mixes Numbers, or Figures, with Letters, by choice. I know that, to ſome, this will appear too trifling for Criticiſm; I think otherwiſe; it indicates a ſlovenly inattention, and is very diſagreeable to refer to, though in peruſal only; like Mr. Kirby's, TOSX (which he has adopted, as it were by choice, in Sect. 4 and 5. Chap. 3. Book I. to denote a Square, or other Rectangle); but, Figures mixed with Letters, are extremely diſagreeable. One thing I obſerve peculiar to this Author; whether he refers to a Line or an Angle (as A, B, or A, B, C,) he puts a Comma between each; in one place (Figure 34) he refers to a Right Line by four Letters, thus; "the Vaniſhing Line (C, D, Z, X,)" how this may pleaſe others, each will judge for himſelf. In Plate 22, is Figure 48, No. 1. and No. 3; but No. 2. (which is referred to, in order) is in Plate 34; yet he does not tell us of it, nor is the Figure of any other uſe, there; the Figures with it, are 63, No. 2. and 3. and Fig. 64. twelve Plates lying between them; ſuch a thing I never met with before, though ſomething like it, in Ditton.

The 3d Section, or Part (as he calls them) is wholly taken up with the delineation and deſcription of the five regular Solids; which ſeems, with many, to be the Ultimatum, in Perſpective; as if but little elſe was wanting, or neceſſary to an Artiſt. I am ſo far from being of that opinion, that I think them the leaſt neceſſary; becauſe, I do not find that ſuch Objects, or any thing like them (except the Cube) ever occurs, in drawing from Nature. For the Speculative, or curious in Perſpective, they are entertaining; and certainly, if a Perſon can project them readily, in all poſitions, he may be ſaid to be thoroughly verſed in the Elements and Principles of the Art, and that is all which can be ſaid of it. For which reaſon, after going through eleven Sections (B. III. in my Treatiſe) which contain not only the Elements of Practice, but alſo their Application to all common and familiar Objects, I have, in the 12th, and laſt, given the Elements and a few Examples in ſuch Objects, for the ſpeculative Artiſt, from a certain and extraordinary Data; which, both he and Hamilton are deficient in; and, for ſuch as deſire to

ſee

ſee them treated more extenſively, I have referred them to him (for I think he has handled the Subject with great judgment, and in a maſterly manner, had he been more explicit and correct) or to Mr. Hamilton; to whom (though he never makes mention of him) I am confident he is indebted. The fourth Section, which is the laſt (except on Shadows) contains the Elements of the preceding Chapter, and ought to have preceded it. He calls them Expedients; undoubtedly they are, as every Rule, by which any Operation is performed, is an Expedient. Yet, although this Chapter contains the Elements of Practice, as from Brook Taylor, there is no regular order, by which a Perſon may proceed in the delineation of Objects from their known or determined Situation, Diſtance, and Poſition, in reſpect of themſelves and of the Picture; being meerly elementary, and reſpecting Lines only; for managing which, variety of Caſes and Expedients are given; ſome of which are ingenious and well deviſed, and ſhew, that he underſtood the Subject clearly, and like a Geometrician. Here, he has alſo attempted the projection of Mouldings, &c. in four Examples, of Cornices in different Orders, which is ſufficient to ſhew he was capable of it; but either he had not patience to go through the neceſſary Proceſs, or not capacitated to lay down Rules for others; the whole being comprized in leſs than five Pages, which would be ſufficient for a large Section, to make it clearly underſtood. Joſeph Highmore

The laſt Section is on Shadows, and Reflections of Objects on the ſurface of Water; whether the Shadows are projected by the Sun, or by a Candle, it is done with judgment, equal to the foregoing; but he is ſtill deficient, in not giving general Rules for projecting them; yet, his reaſoning on the Subject is judicious.

I am much ſurprized at a Paſſage I find here (Page 96. Line 5.), In ſpeaking of an Error in the Projection of Shadows, in parallel Lines, in the Jeſuit's Perſpective, he ſays; "For all Lines, in perſpective, are ſuppoſed to paſs through the eye of the ſpectator, and to meet the plane of the picture ſomewhere (except thoſe which are parallel to that plane); and the point wherein any line, ſo paſſing thro' the eye, interſects the plane of the picture, will be the vaniſhing point of all other lines parallel to that line." As this Paſſage may miſlead the judgment of thoſe who have not a clear conception of the Subject, it were to be wiſhed, that ſome Remark was prefixed to the Margin of each Book. What can he mean by Lines in Perſpective, paſſing through the Eye of a Spectator? for I have no Idea of any that do; he excepts Lines (himſelf) which are parallel to the Picture, and all others are ſubject to one general Law, tending to their Vaniſhing Points. Now, as it was the cuſtom of old Writers, to call that Point on the Picture, to which the Eye is perpendicularly oppoſite, the Point of Sight (and they ſeldom made uſe of any other Vaniſhing Point) they imagined, I ſuppoſe, it was the Eye itſelf; and becauſe all Lines perpendicular to the Picture, in the original Object, appear to tend there, (which the Repreſentations of them really do) they imagined them to paſs through the Eye, and therefore called them Viſuals, or Viſual Rays, which is abſurd, in the higheſt degree. For, Viſual Rays are Right Lines from any Angle of an Object, or any Point to the Eye; which (the Picture being between) muſt neceſſarily cut the Picture; and, the Point in which any Viſual Ray does cut it, is the perſpective Repreſentation of the Point to which it tends, only; and which (it is obvious) neceſſarily paſſes through the Eye. But how any Perſon can imagine, that the Repreſentations of Lines, on the Picture, can do ſo is ſurprizing. Yet I am certain, that many, who are but ſuperficially acquainted with Perſpective, have imbibed that Idea; and, in conſequence, make their Lines converge the wrong way, imagining them to tend towards the Eye.

Whether this Idea originated from the Paſſage, above quoted, is hard to ſay; but I can ſcarce ſuppoſe that the Work is ſo much read as to have given birth to ſo extraordinary an Error, as is warranted by it; the abſurdity of which is ſo very glaring, that it ſcarce ſeems poſſible for any Perſon, who pretends to draw at all, to be guilty of it; or having been ſo once, or ſeen it done by others, that it ſhould not offend his Eye, and make him guard againſt it, in future.

Plate X. Fig. 31. Let ACE be ſuppoſed to repreſent a Box, a right angled Priſm or Parallelopiped; the Face AE being parallel to the Picture, the Lines AB, CD, and EF ſhould repreſent Perpendiculars to it, and therefore, ſhould vaniſh in its Center. But, as the Plane of the Top (AC) is ſeen, the Eye muſt be above it; and ſince the Face CE, alſo, is ſeen, it muſt be towards the right Hand, therefore, ſomewhere in the direction of DC, produced; ſuppoſe at O; but, AB, and EF, do not tend there, but downwards, to P, conſequently, the Eye muſt be there; in which ſituation, the other Face, AG, and the under Face, GE (and not thoſe which are here repreſented) would be ſeen, which muſt be obvious. Now, ſuppoſe the Eye to be oppoſite P, at any diſtance, the Lines AB, &c. would not paſs through it, although they tend to that part of the Picture to which it is oppoſite; whereas, the Center of the Picture is at O, and conſequently, they ſhould tend there, according to the general Idea all have of Perſpective.

By the Lines in Perſpective paſſing through the Eye, he cannot mean a Pyramid of Viſual Rays, the Section of which, by the Picture, is ACE; for, altho' the Rays, projecting it, paſs through the Eye, the Lines AB, CD, &c. which are projected, do not; therefore it cannot be reconciled by that means, nor is there any meaning in the Words which follow; "and the Point, &c." In ſhort, it is not in my power to reconcile the Paſſage, as it ſtands, to common Senſe; yet, there follows this Remark on it; viz. "This is the very conſtruction of a Vaniſhing Point, on which almoſt the whole Practice of Perſpective depends."

By wreſting the ſenſe of this Sentence, various ways, I find, that if three Words are added, the Senſe is clear, as thus; For, *Parallels to* all Lines *ſeen* in Perſpective, are ſuppoſed to paſs thro' the Eye, &c.—which is an eſſential Principle of the Science.

How Mr. Highmore could leave the Senſe ſo vague, of a Paſſage ſo very important, is, to me, aſtoniſhing; in it, he confounds the Idea of an Indefinite Repreſentation with the Radial of the Line, producing its Vaniſhing Point; and ſays, that it is the Conſtruction (or Geneſis) of it. Immediately after this capital Error of his own (in a Nota Bene) he explains the Errors in the Jeſuit's Perſpective of Shadows, with real judgment. Upon the whole, he ſeems to be well acquainted with the Projection of Shadows; alſo, Reflection on Mirrours; but, the abrupt manner, in which he enters upon each Subject, ſhews him but indifferently capacitated to diſplay the Rationale of them to others, or he does not think it neceſſary.

Reſpecting the Figure referred to, ſuch Delineations may frequently be ſeen; not only in the Windows of many Grocers and other Shops, in Town, but (I am ſorry to ſay it) in many better Productions, ſometimes in fine Pictures. What Excuſe could be alledged for the Painter, who, having ſo little judgment, ſhould make his Figures, in the Fore-ground, leſs than thoſe which appeared behind, which were ſuppoſed to be equal? would he not be laughed at by every Dauber? and does not the ſame reaſoning hold good, in every other Object, or in Right Lines? which may be conſidered as the meaſures of Figures; ſurely it does. How abſurd then, to make the Lines, AB, CD, and EF, converge downward, ſeeing that, BC is intended to repreſent a Line equal to AD, yet is longer, though appearing (or intended to appear) farther off; alſo, if DE, and CF, are the heights of Figures, in the Picture (equal in height) the hither one, DE is leſs than CF, at a greater diſtance; which abſurdity ariſes from the wrong convergency of the Lines, AB, &c. But, why it ſhould be imagined that thoſe Lines are tending towards the Eye, rather than at No. 2. I cannot deviſe; for it is certain they do not appear ſo, when the Eye is in the true Point of View (and ſuppoſing the Figure, No. 2. in the place of the other) oppoſite to the Point O, to which they do tend; but, in either caſe, they do not tend towards the Eye, which is not in the Plane with them.

Notwithſtanding, it is manifeſt, that this Author was converſant with Euclid, and, as appears from the Work, competent in Perſpective; yet he abounds with Errors, which are dangerous, as in the Paſſage above quoted; and others which are likely to miſlead; ſuch as in Page 54, Line 19, where, ſpeaking of the Inclination of a Line to a Plane, he ſays (having before obſerved, that a Line which is perpendicular to a Plane makes the ſame Angle every way with it (90 deg.) and

would, if the Plane revolved round on it.) "But if a Plane were to be turned round a Line, making an Angle of 30, &c. the Angle would vary continually, so as to make every other Angle between 30, and its Complement, 150." I ſhould be glad to aſk the Author, how the Plane is to be turned round? Suppoſe a Plane either vertical or horizontal (Poſition is immaterial) and a Line inclined to it in 30 deg. or any other Angle; then, the Line remaining fixed, whilſt the Plane revolves round, being all the while in the ſame Poſition, how can the Angle vary, made with the Line? But, I know he means, that, if a Line be drawn in the Plane, from the Point where the inclined Line cuts it, making the Angle of Inclination, that the Angle will vary continually, with that Line, as above; in which he is ſtill erroneous; for they can never make an Angle greater than a right one, the Line being produced, in the Plane. Many other expreſſions, equally vague or unmeaning, are to be met with; ſuch as (in the N. B. following.) "In this Scheme, B, C, G, is the Vaniſhing Line of a Plane perpendicular to E." It is needleſs to comment on this; for E, being a Point, has the ſame poſition to every Plane, and can vary in nothing but Diſtance, let the Plane have what Poſition it may. Joſeph Highmore

Although I have ſelected theſe Paſſages, only, as being very exceptionable, yet are there many other, equally ſo; to expatiate fully, on all, would make a Volume; let what I have done ſuffice, to ſhew that I am candid in my Remarks, and do not wiſh to put any forced conſtruction on the Author's Words. But, as it is evident, that he muſt be well verſed in Geometry, I am ſurprized at a Reference to Euclid, in Page 82. Fig. 65. where the whole is dependant on Proportion, with which Doctrine he ſeems to be acquainted; yet he refers us, for proof, to the 37, 38, 39, and 40, of the 1ſt of Euclid, which has nothing at all to do with it, being wholly dependant on ſimilar, not on equal Triangles.

This paſſage relates to a grand conteſt, which engaged the Attention of the Speculative, in this Science, about that time, and which the Author was engaged in, reſpecting the apparent, or repreſentative Diameters of Columns; alſo, the Repreſentations of parallel Lines, ſeen direct, &c. and he means to prove, here, that they muſt be repreſented by parallel Lines, let the Eye be ſituated ever ſo near, or oblique, the Picture being parallel to the Wall, which is given for Example. The conſtruction of the Figure, is well meant, and the firſt proof, given, is ſufficient, the latter, is quite ſuperfluous, nor does it render the thing clearer; the former is by ſimilar Triangle, only, the latter forms both ſimilar and equal Triangles, yet the Proof has no relation to the Propoſitions referred to, or it is a far fetched Proof.

I ſhall conclude theſe Remarks with the Author's own Words, who, being himſelf a Painter, in ſome Reputation, knew the Requiſites thereto. After a quotation from the Jeſuit's Preface, in theſe Words; "That Perſpective is the very Soul of Painting, and which, alone, can make the Painter a Maſter;" which he thinks is ſeting it too high amongſt the Requiſites, &c. he adds, "It is certain, however, that Perſpective is an eſſential, and that, whatever is erroneous in this reſpect, does not truly repreſent the thing intended; that it is abſolutely neceſſary to the perfection of Painting; and that ſome ſubjects, particularly Architecture, cannot be repreſented without it.—That great Errors in it are monſtrous, and ſhocking, and that a total Ignorance of it is unpardonable in a Painter, or Deſigner."

To the Work is added a Supplement, containing eleven Pages, and five Plates, in order to explain, better, ſome of his former Diagrams, on Shadows and Reflections; which (unleſs the Book was printed off, before he thought of ſuch Elucidations) is a ſtrange, and, though common, I think a ridiculous way of communicating it. 'Tis a quarto Volume, containing (with the Supplement) 129 Pages, and 48 Plates, many of which are not half filled. There are no finiſhed Pieces, yet ſome that ſhew Deſign, and Taſte; but, in the Diagram Plates, here is the greateſt waſte of Copper I ever ſaw, except in Kirby's laſt Work. There is an Introductory Chapter, of eight Pages and two Plates, on Geometry; a ſhort Preface but no Dedication. He ſays it was written many Years ſince, but now firſt publiſhed; printed for Millar and Nourſe, in 1763. Price, one Guinea. I believe it has not gone through a ſecond Edition, nor will, I am of opinion, haſtily.

DANIEL FOURNIER. 1764.

ON a curſory View of a Treatiſe on the Theory and Practice of Perſpective, by DANIEL FOURNIER, ſome time ago, I thought it appeared well adapted for a practical Treatiſe, and have often given it the preference to others, on that ſcore; for, the Plates have ſomething ſtriking in them, which catch the Eye, the Figures are taſty, and appear rather maſterly, which are apt to prejudice a ſuperficial examiner in its favour, more than the performance really merits; which ſhews, that no judgment can be formed of ſuch Works, at ſight; ſeeing that, making a few Sketches, or even a fine Drawing, and treating the Subject properly, are but ſeldom within the province of the ſame Perſon, which is here verified: for, although the Work is not deſtitute of Merit, yet, on a cloſer and more critical Inſpection, it falls far ſhort of what I expected to find it. His Preface begins thus. "As Dr. Brook Taylor's Perſpective is undoubtedly the moſt excellent performance, of its kind, hitherto made public; I choſe rather to attempt an explanation of his principles, than to offer any thing of my own, with regard to the theory of this moſt uſeful art." Indeed, if a literal copy of the Doctor's Theory, and elements of Practice, may be called an explanation of it, he has certainly done it; but, where he has ventured to deviate from him, he is ſcarce intelligible, in ſome places not ſo, ſeldom that he renders the Text clearer. He has even copied the Doctor ſo very cloſely, as to copy his literary Errors, which indicates his Ignorance of what he attempts to elucidate; for ſurely, if he had examined it, with due attention, neceſſary on the occaſion, he would have diſcovered the Errors.

In Theorem II. of the ſecond Part (for it is that he has copied) it is thus expreſſed. "The perſpective repreſentation, or projection, of any object, is the ſame as the *ichnographic* projection of it, on the plane of the picture, the point of ſight being the vertex of the optic cone." Now, that this is an overſight, or error of the Preſs, in Brook Taylor, is evident, from a remark after the 6th Definition; where he ſays, "it will be evident, from Theo. 2. that it is no other than its *Schenographic* Projection." But ſurely, the ſame excuſe cannot be alledged, for him who copies it; I ſaw the Error, in both, on the firſt reading; nor can I be perſuaded that any Perſon, who was acquainted with the Terms, could paſs it over unnoticed. In order to copy him with leſs trouble, and more ſafety, though ſome of his Diagrams are varied a little, they are lettered the ſame; ſo that, where the Doctor has made a miſtake in his Reference, Fournier is the ſame; as in Prob. 6. Otherwiſe *by the Directors.* In the firſt Line is DF for FE; and, in the fourth (3d in Fournier) is AF for FE, the very ſame in both. This Error, in Dr. Taylor, I had corrected, ſeveral Years ago; and, on examining this Work, now, I did the ſame, before I compared them; ſurely then, he who was publiſhing the ſame Work, over again (in part) ſhould have corrected *thoſe* Errors, though he had run into others, which is almoſt unavoidable.

As the whole of the Theory, in this Work, is almoſt a literal Copy of Brook Taylor, on which I have already given my Sentiments, it would be ſuperfluous to dwell longer on it here; the Definitions, the Axioms, Theorems, and Corollaries, deduced from them, are the ſame, in Order as well as in Number; in ſome of them, having given other Figures, his Demonſtrations vary, in form, though the ſame in ſubſtance; ſome of the Doctor's Remarks are omitted, and ſometimes he makes Remarks from his own Figures. In the 5th Theorem, the Doctor refers, for proof, to Prop. 16. 11 Euc. which, Fournier, in copying, has made, Euclid II. 16. a miſtake which, as a Copy, is inexcuſable; yet I do not impute it wholly to Ignorance, but rather to an indolent inattention, or rather to a volatile diſpoſition, by nature; it is apparent throughout the whole Work, which abounds with Errors. The other, in which the Original is miſtaken, muſt proceed from his too great confidence in the Doctor's Infallibility. The 7th Theorem is in theſe words; "All lines in any original plane have their vaniſhing points in the vaniſhing line of that plane," which he demonſtrates thus; "For as all the original lines are in the ſame plane, the lines which determine their vaniſhing points" *(ſeeing they are all in the Parallel of the original Plane)* "will interſect the picture in the vaniſhing line of the original plane;" which, omiting the Parentheſis (the ſubſtance of which the Doctor

Doctor has) is arbitrary. The 8th Theorem, in the latter part, where he has thought proper to depart from his Text, is unintelligible, viz. "Interſections of all lines in the ſame original plane; and alſo, the line which determines the interſection of that original plane with the picture, are in that plane." The Doctor ſays only, (after the Semicolon) "are in the Interſection of that Plane." Both add, "This needs no Demonſtration;" indeed I don't comprehend the Premiſes, in Fournier; ſo that a Demonſtration would be to little purpoſe. However, both the 7th and 8th as in the Original, being clear in the Premiſes, are ſelf-evident. I have included both in one Theorem, the 10th of the 2nd. the 11th of the 1ſt Impreſſion, of my Treatiſe. Daniel Fournier.

The problematical part of this Work is, by much the greater part, a literal Copy of Brook Taylor; and where it is ſo, it may (Errors excepted) be depended on, which cannot, where he leaves his Guide, and ventures out of the direct Path. Problem the 1ſt. he does not perform, but refers only to a theoretic Figure, for a Solution. In the 2nd he wanders, ſtrangely, from the Premiſes he gives, from Brook Taylor; miſtaking, or making uſe of the Seat of a Point aſſumed, inſtead of the Angle given, which the Line makes with *its* Seat, ſo that, he performs it by a proceſs which is foreign; and he miſtakes a finite part for the indefinite Repreſentation; the laſt ſtep in the proceſs is previouſly neceſſary to what is done before. The 7th Problem, to find the Projection of a regular Pentagon, given in the original Plane, he has copied exactly, with all the Defects. One Side being parallel to the Interſection, there are, conſequently, four vaniſhing Points; the Interſecting Points of the other four Sides are determined, yet no more than three indefinite Repreſentations are drawn; inſtead of drawing the fourth (which is as neceſſary as the reſt) we are told to draw KO, to do what the other would have done better, KO being entirely uſeleſs; and yet, neither of them has drawn KO, but the Point it would produce, is aſſumed; we are told, at the ſame time, to draw O,N; and, laſtly to draw OP. Now OP and ON are Viſual Rays cuting two of the indefinite Repreſentations, in order to obtain the parallel Side, one of which is ſuperfluous; yet, neither one nor the other finiſhes it, by telling the Reader to draw the parallel Side.

I ſhould not have been ſo particular in this Problem, but for the ſingularity of the Copy being ſo exact, in every reſpect, when it would evidently be better to have deviated from the original; but, his View ſeems to ſave himſelf all the trouble he could. To point out every Error in the Work is far from my intention; I rather expected, and wiſhed to find in it, matter worthy of praiſe, but own I am moſt miſerably diſappointed. But what, to me, is moſt extraordinary; in many reſpects, it appears that he is tolerably converſant in Geometry, particularly in the Doctrine of Proportion, yet, in ſeveral places, he is egregiouſly erroneous; in the 15th Problem, after copying his Author, literally, both in the Proceſs and Demonſtration (in which he corrects a wrong Reference) he thinks proper to do it *otherwiſe*; in which he tells us to take a meaſure (FP) equal to the Quotient ariſing from the ſum of the two Squares, of the Perpendicular and the greater Segment of the Hypothenuſe, of a right angled Triangle, divided by the Hypothenuſe; which FP is the oppoſite, i. e. the leſſer Leg of the Triangle. Let FPB be a right angled Triangle, PC the Perpendicular; then, according to his words, it will be, that FP=PC ſquare +CB ſquare, divided by FB, the Hypothenuſe. Now, PB ſq. =PC ſq.+CB ſq. wherefore, FP=PB ſq. ÷ FB; and conſequently, that the three Sides of a right angled Triangle are Proportionals; a diſcovery never, I believe, found out before. Fig. 32.

There is another Inſtance of (I muſt call it) his Ignorance, of the abſtruſe, or moſt ſublime part of Perſpective, relative to inclined Planes, which requires more geometrical knowledge than many are poſſeſſed of. But this, for which he is truly reprehenſible, and deſerving a ſevere Cenſure, is an attempt to prove Mr. Kirby in an Error, in his 71ſt Figure; Plate 13. B. I. but, unluckily, 'tis himſelf that is in the wrong. In Example 32, after illuſtrating the preceding Example, by a very ingenious and well-adapted Diagram, he proceeds thus, "But as a certain modern

Daniel Fournier. Author has laid down a general rule (in his treatiſe of Practical Perſpective) to find the vaniſhing line of an inclined plane and oblique to the picture, by an angle given, which angle of inclination is ſet on the horizontal line, without having regard to the interſection that inclined plane makes with the picture, which is falſe; for the vaniſhing line of *any* inclined plane muſt be parallel to the interſection of that plane with the picture * (by Theo. 6.); therefore, to prevent the reader's thinking I am partial, I have given the following example taken from his Practice." Here he goes through the proceſs, quoted from Kirby's Book, and then adds, "But, as I ſaid before, the vaniſhing line of that inclined plane cannot be found without having the interſection of that plane with the picture; nor can the angle BAC be the angle of inclination wanted, as the plane is ſuppoſed to incline to the picture. But on examining the Fig. 1. Plate 25. this will appear erroneous."

As it is manifeſt, that either one or the other of thoſe Gentlemen muſt be wrong; and I have not heard that it ever was noticed; by Mr. Kirby, I ſhall, by a true copy of the Diagram, lay it before the Public, for their determination who may not have ſeen either of their Books, referred to and quoted, as above. See Fig. 33. Plate 10. in which, the given Angle of inclination with the Horizon (according to Mr. Kirby) is BAC; HL is the Horizontal Line, and C the Center of the Picture; CE is the Diſtance. As for the Object tozx, 'tis not of the leaſt uſe; the Buſineſs is, to determine the Vaniſhing Line VL, of a Plane inclined to the Horizon, as above, L being the Vaniſhing Point (given or found) of Lines in the Plane which are parallel to the Horizon.

Fig. 33.

E being the Eye, LE is drawn; and EH perpendicular to LE, cuting the Horizontal Line at H. Then, HI being equal to HE, and the Angle HIV equal to BAC, cuting a Line drawn from H, perpendicular to the Horizon, at V; VL, being drawn, is the Vaniſhing Line required. But, Mr. Fournier ſays it is falſe; for the Vaniſhing Line muſt be parallel to the Interſection of the Plane, with the Picture, which it certainly muſt; but he has not proved that it is not ſo, how then can he aſſert it is falſe, on that ſcore? On the contrary, I aſſert; that it would be parallel to the Interſection of *any* Original Plane, given, in that poſition to the Picture, which I will make appear, to demonſtration.

VL is the Vaniſhing Line, found, of a Plane inclined to the Horizon, in the Angle HIV, equal to BAC. The Angle of Inclination of two Planes is that which is formed between two Lines (one in each Plane) drawn from the ſame Point, perpendicular to their common Section †, which is therefore perpendicular to a plane paſſing through thoſe two Lines (Eu. 4. 11.) in which Plane, the Angle is truly meaſured. L is the Vaniſhing Point of their common Section, and LE is its Radial, or Parallel producing it (Def. 14.) and, LEH is a right Angle; wherefore, HV is the Vaniſhing Line of a Plane, to which, the common Section is perpendicular, and EH is its Diſtance. But, HI is made equal to HE, and HIV to the given Angle, of the Inclination of the original Plane to the Horizon; wherefore, if LEH be turned up, on HL, perpendicular, and HIV, on HV, until I coincides with E, it may then be ſeen, that EH is the Radial, that is parallel to the Original, of tx, and EV of ty and oz, conſonant to his own Diagrams (2 and 3. Plate 7.) from B. Taylor; and conſequently, that V is their Vaniſhing Point ‡. But, L is a Vaniſhing Point of certain Lines in the Plane; therefore, VL is the Vaniſhing Line required (Theo. 7. P. 16.) which would be parallel to the Interſection of the original Plane (Eu. 16. 11.); being the Interſections of parallel Planes, with the Picture.

Now, this being the caſe, as it muſt be obvious, to every unprejudiced, or to every geometrical Reader, what excuſe can be alledged for this virulent attack on Mr. Kirby, who was then living; and, although his Work is puerile and ungeometrical, in a very great degree, yet this Problem is performed ſtrictly geometrical. Therefore, I thought it incumbent on me, to ſet the matter in a clear light; and, as far as I am able, to vindicate Truth from Calumny.

* It is ſo in general; why then ſo particular?

† See the Introduction, B. II. Art. 4.

‡ Fig. 72. in Kirby's Book, has moveable Schemes, for illuſtration of the Proceſs.

Mr. Fournier has aſſerted that the Vaniſhing Line cannot be found without the Interſection; becauſe one muſt be parallel to the other. Therefore, in the Proceſs, by him, amongſt other things, neceſſarily given, he gives an Interſection, as G H; but he has alſo given the Interſection of a horizontal Plane, which, according to his Propoſition, is in no wiſe neceſſary, it being a common Caſe*; the Operation is therefore performed without it, which, on Mr. Kirby's Premiſes cannot, as it is evident, on inſpection. I am really of opinion, that, having given the inclination of the Plane to the Picture, inſtead of the Horizon, he knew not how to obtain either the Interſection or the Vaniſhing Line. Daniel Fournier.

After this follow ſome Examples on inclined Objects, but all in the ſimpleſt poſition; that is, when the Vaniſhing Lines are parallel to the Horizon, in Wedges, Priſms, and Cubes, reſting on a Side, or Edge, parallel to the Picture. A Flight of Stairs in this poſition, is the principal Object; but his deſcription of the Proceſs is trifling, and, though tedious, ſeldom clear; leaving it to the Reader's Capacity to go through with it. He gives Examples of Chairs, whoſe Seats are Squares, and the whole Frame is a Cube; the Backs ſtreight and upright, and two Squares above the Seat. He determines every thing, in reſpect of meaſure, by the Vaniſhing Point of the Diagonal of a Square; nor does he, in the elements of Practice, ever ſhew how to lay down the diſtance of the Eye from the Vaniſhing Points, of Lines inclined to the Interſection or Ground Line, by which, to cut off any determined portion of the indefinite Repreſentation.

His Figures are all direct, in poſition; an Iſoſceles Triangle regularly poſited; a Square, parallel, and another direct on the Angle; a Pentagon, direct, and a Square with a Circle inſcribed are the whole. His plane Solids are two Cubes, one direct in front, the other on the Angle; a Pyramid on a ſquare Baſe, the ſame; a Chair, as above, and a Table which is a right-angled Parallelopiped, parallel to the Picture. Then follows a moſt clumſey Wheel, which he calls a Water-Wheel; but, diveſted of a parcel of Bricks, which are placed edge-ways on the Rim, would paſs better for a Dray or Waggon broad Wheel, though ſomewhat clumſier. I have heard ſome ſpeak of this Example, as an extraordinary one, and indeed ſo it is, for it exceeds *ordinary*. Next follow ſome Examples of internal Subjects, with the method of determining Doors, opened in certain Angles; theſe muſt be ſeen, in order to conceive a proper Idea of them, for they exceed all deſcription. Then follow Mouldings, in an ill-formed Pedeſtal, with a Cavetto for the Baſe, and a Cyma reverſa for the Cornice; with a clumſey Tuſcan Entablature (turned upſide down) conſiſting of an Ovolo with a Bead, for the upper Moulding, and a large Cyma reverſa for what is called the Bed Mould; both are parallel to the Picture. Of theſe, the Deſcription and method of proceeding are ſuch as cannot be imagined; yet they are preferable to what Kirby had done, in that way, in his firſt Work.

The Tuſcan Baſe and Capital, for a Column, are next handled, and after the ſame manner as Kirby, by vertical Sections, paſſing through the Axis of the Column; which, where they apply them, are not of the leaſt uſe; all the difficulty conſiſts in deſcribing the Contour of the Torus, or Ovolo, at the extremes; the reſt lying between parallel Circles, the prominency is expreſſed only by Light and Shade. They are alſo (like Mr. Kirby's) obliquely parallel to the Picture; but the Curves are much better delineated; owing, in the Torus, to the method applied, by parallel Circles, as well as to his greater facility in drawing from an Object. Theſe, with the Wheel, are the whole of round Objects; ſave two Cylinders, one upright, the other perpendicular to the Picture. I have heard his method of deſcribing a Circle applauded, but muſt own I find nothing in it either new or ſingular; 'tis from a parallel Diameter, given, and conſequently in the ſimpleſt poſition, effected by means of the Diſtance of the Picture laid on the Horizontal Line, the Vaniſhing Points of Diagonals of a Square, and the diſtance of thoſe Points; one of which is ſufficient, though he makes uſe of both. This is the firſt inſtance in which he lays down the Diſtance of any Vaniſhing Point, but the Center of the

* Any Interſection being given, and the Vaniſhing Point of any one Line (as L) in the original Plane, the Vaniſhing Line is determined by the ſecond Theorem, Coroll. 1. being parallel by Theorem.

Daniel Fournier. Picture; and again, in the 20th Example, for determining the Pannels of a Door, which is open; but has no where laid it down as a general Rule, before Example 54. Plate 37. (where it is vilely handled) for proportioning Lines in every poſition to the Picture, but parallel, and in whatever Plane.

The 29th Example is in theſe words; "To find the middle or center of any arch or building," *any* Arch, *or* Building; ſure, never ſuch a Problem was given before, in Perſpective. Here is given a great lumbering Arch, on two high Piers, direct in front, which, at ſight, one would imagine was in order to the Delineation; but, 'tis only to find the Center of the Arch, to hang a Lanthorn from. In the next Example and Plate, we have a curious horizontal Picture; not on a Cieling, but on a Floor, ſeen flying, by ſuppoſing (as he ſays) the Eye ſo placed in the Air as to look down into the Building: the method to effect it is indeed the ſame, but the Deſcription is trifling, and left off abruptly. The laſt Plate, in this part, ought to have been amongſt the firſt; the Example, or Problem, is to divide a given line into any number of equal parts, for the Steps of a Ladder.

Having done with the delineative part of the Work, he proceeds to Shadows; in which, he ſeems to lay down the Principles as one who knows it, himſelf, but not in the cleareſt and moſt intelligent manner for thoſe who knew nothing of it before. I ſhall paſs over a few Examples, in two Plates, as they contain nothing particular, and only take notice of the Shadow in the Head of a Nich, which is erroneous; by which, the Curve is made more convex than it is poſſible to be, in any poſition of the Luminary. This is a circumſtance which has occaſioned ſome debate, in reſpect of the Curve, which is rather paradoxical; and which, many, who never inveſtgated, or properly conſidered the cauſe, have exaggerated in a moſt extravagant manner; as is the diſpoſition of moſt Men, to heighten what ſeems improbable, by rendering it impoſſible. The Error, which occaſions too great a convexity of the Curve, is obvious; but, as it ſuits with the notion many have formed of it, may paſs unnoticed. Inſtead of vertical Sections, parallel amongſt themſelves (as in Fig. 39. Plate 45. of my Treatiſe) he makes them all paſs through the Vertex, of the head of the Nich; although, at the bottom, they are ſuppoſed to be conſtructed on parallel Lines, an abſurdity of the groſſeſt kind; conſequently, the Curve comes nearer to the Vertex than it could poſſibly do, from the Situation, given, of the Luminary.

His method of determining the Shadow of a Globe is correct; but the deſcription is greatly defective; a general fault in this Work. The next Example (the 50th, Plate 36.) being taken from Brook Taylor, it is uſeleſs to expatiate on; but, the Tetraedron, which he calls a regular one, and in the Original appears to be ſo, is a vile repreſentation. The reſt of the Shadows, and Reflections on the ſurface of Water, are common-place Subjects, not worthy of notice. Reflection on a Mirrour is alſo copied from Brook Taylor, excepting that the Picture on the Eaſle is ſupplied with a Cage, hanging from the Cieling; but the Proceſs, although he proceeds in the ſame manner, is, in ſome parts, unintelligible, in others prolix and unneceſſarily tedious; ſeveral falſe References, eight or nine in half a Page; and a deſcription of part of the Proceſs, for determining the Vaniſhing Point of Lines perpendicular to the Mirrour, for which, not a Line is drawn, nor the principal Letter, which repreſents the Eye, to be found; Omiſſions of this kind are frequent in this Work, in fact, the Author was a wonderful Genius.

Here follows an Example of a Down-hill, or direct Deſcent, which is well deviſed; being a Slope from a level Ground down to a Brook, which runs parallel, in the Picture, under two Arches (one on each hand), the Ground riſing again, on the other ſide, to a level; the boundary Lines, on each ſide, aſſiſting the Deception. The Vaniſhing Lines of the Deſcent and Aſcent, are properly determined, and the Vaniſhing Points of the Diagonals of a Square, in thoſe Planes, for each Slope is a Square, as is alſo the Brook, between the Arches. A Landſcape with a Road over a riſing Ground (a good effect) and ſeveral others, with Out-lines, as for a Drawing Book, come after; with two, large, rough Etchings, of no uſe in the Work, making, in all, 51 Plates, and 94 quarto Pages. Printed for himſelf, and ſold by Nourſe, in the Strand; publiſhed in 1764.

IN

IN the year following, viz. 1765, a theoretic Work on Perſpective was published of a very ſingular kind, by JOHN LODGE COWLEY, Prof. of Math. at the Royal Academy, Woolwich; which, for thoſe who cannot ſee the intention of a Diagram, exhibiting Solids, or Planes in various poſitions, i. e. ſuch as do not enter readily into, and clearly comprehend a Delineation on a Plane, may be aſſiſted in forming Ideas of the Subject, from this Work. Having formerly publiſhed an Appendix to Euclid's Elements of Geometry, in order to illuſtrate the Doctrine of Solids, by means of moveable Schemes, ſo contrived as to fold up into the form of each Solid, with diagonal or other Sections, where required; which Work was much approved, and deſervedly, inſomuch that, a ſecond Edition, on an improved and more extenſive Plan, ſucceeded the firſt. This induced him to conſider Perſpective in the ſame manner, in order to convey Inſtructions to his Pupils (by Lectures) more intelligibly; by way of Apparatus, in Lectures on ſuch Subjects, it was neceſſary, and eaſily practicable, but to contrive them ſo, as to be put into a Book, required Genius; and indeed, there appears great geometrical Genius in the contrivance, to lay the various Conſtructions down, in plano, ſo as to fold in a Book. At the ſame time, the trouble attending raiſing them up, and diſpoſing them properly, is more than may be imagined, even to one who knows what they all mean; but, for one who is not, in ſome degree, acquainted with it, to put them together by the Deſcription is almoſt impracticable; and when done, to find out all the References, for Demonſtration, is a trouble few Learners would go through to acquire it. But, thoſe who have leiſure for it may be both entertained and improved thereby; more eſpecially, if they have gone through his former Work, they may acquire from this, a clear and comprehenſive Idea of Perſpective, in Rationale, and that is all the Author intended; for he ſays, in the Preface, that he has no pretenſions or aim at extending or enlarging the field of Science by it, but to render it eaſy and perſpicuous. Profeſſor J. LODGE COWLEY 1765.

Before he enters on the Subject, by an explanation of the Diagrams, which are of Paſteboard, being cut out ſo as to raiſe up, in order to form the various Conſtructions required (ten of which, with one other Plate, containing two Figures only, are all the Plates in the Work) he gives a brief Hiſtory of Perſpective, begining with Vitruvius; but, without any explanation of their various methods of Practice. He ſpeaks of Peruzzi, of Sienna, as the Author of Sirigatti's Method; which he ſays was followed by Vignola, then by Sirigatti, and by Pozzo (in his ſecond Volume); but although Vignola, he ſays, copied him, to a degree of ſervility, yet he does not altogether approve of that Method, but prefers his other, on the Jeſuit's Principles; I mean, which the Jeſuit and others have followed. Next he ſpeaks of Ubaldus, as one who has treated it more ſcientifically, and as the firſt whoſe Ideas had a tendency towards rendering the Principles univerſal; but accuſes him of great prolixity, in extending his Theory through ſo many Propoſitions, the whole of which might be compriſed in a few Pages. Before Peruzzi, he mentions Albert Durer, and Petro del Borgo; who, before Durer, wrote three Books, highly extolled by Ignatio Dante, which are entirely loſt. Reſpecting the Jeſuit, and others, amongſt the old Writers on Perſpective, the Works of Peruzzi and Ubaldus, he ſays, have been the general Store-houſe, to which they have all had recource, for the Principles they make uſe of.

Amongſt the Moderns, he begins with Brook Taylor, who, he tells us, condeſcended to write on the Subject, and ſtiles him, The celebrated Geometrician. In his ſmall Tract, he ſays, the Doctor made prodigious advances, towards bringing the Art to its ultimate degree of Perfection; and laments, that his Death deprived the World of a Treaſure, which might have accrued from a Work in which he intended to enter on the Subject more extenſively. The learned and ingenious Mr. Hamilton, (he ſays) with the aſſiſtance of the Doctor's Principles, has copiouſly treated the Subject of Perſpective, in a ſtrict, mathematical way; which is all he ſays of him; but of Mr. Kirby, between whoſe Works there is no compariſon to be made, he is laviſh in his praiſe. "This ingenious Author by attentively examining and applying Dr. Taylor's new principles of Perſpective to practice,

J. Lodge Cowley.

practice, was gradually led to a diſcovery of their generality and facility in operation, ſaw how preferable and excellent they were in practical applications, how ſimple and extenſive their conſtructions, what a vaſt confuſion of unneceſſary lines were thereby avoided, and how beneficial they would be if generally known to artiſts concerned in works of deſign; poſſeſſed with theſe and ſuch like conſiderations, he employed himſelf zealouſly to retrieve them from that ſtate of darkneſs in which their author's brevity of expreſſion and manner of writing had concealed them, and became the firſt among artiſts, who appeared in publick, to explain their true nature and uſe in adapting them ſuitably to the arts of deſign."

Here, we have a remarkable inſtance of the partiality of Mankind, which ſhews how little is to be depended on the veracity of Writers, in general; one might be led to imagine (from a Perſon of Mr. Cowley's reputation) Mr. Kirby, a Man of the firſt rate abilities, in his Line. He ſhould as candidly have acknowledged, that Mr. Kirby, with the aſſiſtance of Mr. Hamilton (as, that Mr. Hamilton, with the aſſiſtance of Brook Taylor's Principles) had rendered thoſe Principles ſomewhat more practicable, in a leſs compaſs, i. e. in a leſs voluminous Work, and in a much leſs ſcientific manner, bordering on puerility, which is the real Caſe; and which (making uſe of Mr. Cowley's manner of expreſſion) is not meerly our own bold aſſertion, but has the united concurrence of every Perſon of underſtanding, in the Science, as appears from the Writings of various Authors, who have juſtly cenſured his Works. Speaking, further, of his great Abilities, of the encouragement he met with, at firſt, how joyfully the Artiſts, in general, embraced his Deſign, his perſeverance and intrepidity, by which he overcame all the various oppoſitions to it, he thinks it a juſtice due to the memory of ſuch ingenious Authors, who have contributed to improve and exalt this Art to perfection; and, that it required his "endeavours to reſcue them from the undeſerved cenſure lately paſſed upon them, of not having made the leaſt improvement *; as well as to vindicate *ourſelves*, by ſhewing that what *we* have advanced in favour of *our* author is not our own bold aſſertion only, but has the united ſuffrage of a body of Artiſts, well-qualified to judge deciſively in this matter, by whoſe order," &c. Here follows the Advertiſement already inſerted, Page 109.

I am afraid, that Mr. Profeſſor, in imitation of his favourite Author, has paid a Compliment to the Artiſts, of that time, at the expence of his Veracity; for I am far from thinking they were qualified to judge *deciſively* in it, although their Suffrages were to be regarded, as Perſons whoſe Opinion muſt be allowed of weight. He tells us, that Fournier thought his ſecond Edition worthy his making free uſe of; but muſt own, I ſee but few traces of one in the other. He then ſpeaks of his Perſpective of Architecture, a large † and elegant Work, containing two Rules of univerſal application; I could wiſh to have aſked Mr. Cowley, if he really ſuppoſed thoſe two Rules (to put a Square and a Circle into Perſpective) are, or can be applied univerſally? I think he durſt not, boldly, have aſſerted it.

He juſt mentions a few more Authors, viz. Hondius, whoſe Inſtitutions, he ſays, were formerly held in great eſteem. This is a ſmall folio Work, in Dutch, of very little value, apparently, without a Date. Alleaume's, he ſays, deſerves to be more known than it is, being well adapted to the purpoſes of Artiſts: this Work I have never met with. De Chales's, he ſays, is remarkably neat. S'Graveſande's is recommendable for Practice. Lamy's contains ſome proper notices on the ſubject of Painting. M. De la Caille's (Sal. de Caux) deſerves to be noticed with reſpect; and the Treatiſe, referred to in the Note, as below, is diſtinguiſhable for its brevity and particular ſingularities. &c. with which he concludes his Hiſtory; and which, ſeems to be intended meerly as a Puff, to ſet Mr. Kirby off to the beſt advantage, in *his* power.

* See Page 311, of Elements of Mathematics, &c. with a new Treatiſe of Perſpective, for the uſe of the Royal Academy at Woolwich; by Muller, mathematical Profeſſor.

† This puts me in mind of a large Picture, exhibited ſeveral years ago, which had little or nothing to recommend it to notice, but length and breadth; in Strictures on the ſeveral performances, then exhibited, all that was ſaid of it was, an *exceeding large* Canvas.

This

Profeſſor Cowley.

This Work is in two Parts, or rather in three; the firſt, called the Doctrine of Planes, contains ſeven Definitions, reſpecting their Poſitions to one another, &c. and ſixteen Theorems, chiefly from the 11th Book of Euclid. The ſecond is, in the laſt part, exceptionable; viz. "three Lines which meet one another are in one Plane." The fifth is alſo very exceptionable, and the Affirmation vague; but, as it is in Geometry, rather than Perſpective, and would take up too much time to render it clear, I ſhall paſs it over. The eighth is an Axiom, and the eleventh alſo. The fifteenth is not in Euclid, the ſame, in ſubſtance, with the 11th. B. 7. of mine, and is very uſeful in Perſpective; and, the 16th is the converſe of the ninth. This is the whole of the firſt Part.

The ſecond Part is alſo called the Doctrine of Planes, applied to the true Principles of Perſpective, digeſted into Theorems, with ſeveral Corollaries deduced from them; ſome of which are rather too far fetched.

His Definitions are full and to the purpoſe, in general, ſave the third, which ſays that "the plane which contains the objects given to be deſcribed on the Picture, is called the *Original Plane*." This is limited, and conveys a very imperfect Idea of what is meant; as every Plane which is repreſented is an Original Plane, as well as that on which Objects are ſeated, and is what *he* means; but, that a Plane ſhould contain Objects is abſurd, for it can only contain Figures. In the fifth, he confounds the Axis of the Eye with the Diſtance of the Picture, which indicates a limited length; whereas, nothing more ſhould be meant by it, than that, the Axis of the Eye being produced, determines the Center of the Picture, and, in *that* caſe, meaſures its diſtance; but, to call the Diſtance (as he frequently does) the Axis of the Eye is very abſurd, and renders the ſenſe at leaſt ambiguous and imperfect.

As the whole of this Work is theoretic, it is therefore rather copious; but the ſubſtance of the whole might be compriſed in much leſs compaſs. Here are 19 Theorems, ſeveral of which are not of the leaſt uſe in the art of Delineation, which is the thing aimed at; nor indeed of conſequence enough for Theorems. The fourth ſhould precede the firſt; viz. "Original planes, parallel to the picture, have neither vaniſhing, interſecting, nor directing lines." Being clear in the Definition of a Vaniſhing Line, this might paſs for an Axiom, therefore I have made it the firſt, in my Treatiſe; it follows then, naturally, to determine what are the conſequences ariſing from the interſections of Planes which are not parallel to the Picture, which is determined by the ſecond (the firſt in this Work) that thoſe Lines are all parallel to each other. What the ſecond Theorem is intended to prove (reſpecting the Vertical Plane) may all be deduced from the definition of it; the third is to little purpoſe; the 5th and 6th, with their Corollaries, are pertinent; but the 7th is of no conſequence, as it reſpects practiſing by the Directing Plane, which is ſeldom done, and frequently impracticable, or attended with unneceſſary trouble. The 8th ſhould have been a Corollary to the 5th, and the Corollary to it would have followed there, better than here; 'tis the 10th of mine; as it reſpects Vaniſhing Points, I am of opinion it comes better after the Theory of Vaniſhing Lines, and alſo, after that Theorem (the 18th of this) which reſpects Lines parallel to the Picture; and which is, here, partially determined, in theſe words. "If an original line be given in a plane, parallel to the picture, it will be in the ſame proportion," &c. Why confined to a Plane which is parallel to the Picture? when it is manifeſtly the ſame being in *any* Plane *however* ſituated. The 10th is the fourth, and the 11th the third of mine; the Corollary to which is impertinent, meerly a negative to the reverſe of the Premiſes of the Theorem. The 12th is the fifth of mine, and the 13th unneceſſary, being the converſe of it. The 14th, 15th, and 16th, are of no conſequence, as Theorems, being meerly Remarks, which might have been made after ſome of the other; the 17th is a Corollary to the 12th, a neceſſary conſequence of it; and the 19th, though an extraordinary property, and made a great deal of, is to no purpoſe whatever, in Drawing.

This Theory is illuſtrated by the Diagrams, mentioned above, cut out, in Paſteboard, ſo as to form every Conſtruction of the elementary Planes, neceſſary for the Inveſtigation, with great ingenuity and trouble, too much for human patience, to

Profeſſor Cowley.

beſtow on each Book. In ſuch a Work, it is no wonder there are falſe References, and that many of them ſtand the wrong way in the Plates, when the conſtruction is formed, ſo that 'tis troubleſome to find them out, frequently, which is perplexing to the Reader. After the Theory (in a Concluſion) he gives five Problems; three of which, had the Schemes been more general, and more diſtinct, contain the Elements of Practice, in all common Caſes. The firſt is, to find the Indefinite repreſentation of a Line inclined to the Ground Line; but (according to cuſtom) in an Angle of 45 deg. the Diagonal of a Square; (See Prob. 17. Sect. 5. B. III. or the 7th. Sect. 4.). The third is, a Vaniſhing Point being given of certain Lines, to find the Vaniſhing Point of other Lines making a given Angle with the former (See Prob. 4. Sect. 3. B. III.); the Example is of a Right Angle, both Sides inclined equally, in 45 degrees. The fifth is to find the Image of a Point; (See Prob. 14. Sect. 5. B. III. Meth. 3rd.); his Lines are equally inclined. Four Examples follow; one for the Problem, the ſecond for a Line perpendicular to the Interſection; the third for Lines parallel to it, and the fourth for Lines poſited obliquely. The Scheme, for illuſtrating, as well as performing theſe Problems and Examples, is really ingenious; by which is ſhewn, to ocular conviction, that the Theory and Practice perfectly agree; for, after the proceſs, the Scheme (which is ſimple) being raiſed, the correſpondence with Theory is obvious; by means of ſilken threads, fixed to the angles of the Figures, and paſſing through the Picture to the Eye, indicating Viſual Rays, by which they are ſuppoſed to be ſeen. The Figures are, a Square, parallel, another diagonal ways, and a Pentagon, regularly ſituated, centrally. Had they been kept farther aſunder, ſome of them farther from the Interſection, the Pentagon obliquely ſituated, and inſtead of the Square diagonal ways, an oblong Rectangle oblique to the Picture, a better Diagram could not be deviſed for the purpoſe, being very ſimple, yet ſufficient in a Work of this kind.

He proceeds with Annotations on the ſecond Part, which, in quantity, is equal to, if not more copious than the Part itſelf. Firſt, of Projection, in general, and the various kinds of Projection; he ſpeaks of Military Perſpective (as it is abſurdly called) as a medley of Projections the moſt inconſiſtent, unnatural and abſurd; which can anſwer no purpoſe whatever, but what may be better attained by true Perſpective. This is, almoſt verbatim, the opinion I always had of it, and as I have expreſſed in the ſecond Section, Page 27. Secondly, he ſpeaks of the conſtruction of imaginary Planes neceſſary in Perſpective, by means of which, the poſitions of Objects, in reſpect of the Horizon and of each other, are determined; being otherwiſe undeterminable, which is juſtly obſerved. He ſpeaks, with propriety, of the limited Ideas the old Writers had of Perſpective, being confined wholly to the Horizontal and Ground Lines, without ever conſidering, that Lines of the ſame utility may be applied to Planes in all Poſitions; but, that it would be abſurd to uſe the ſame appellations to them. Next, he ſpeaks of the different poſitions of the Picture, reſpecting the Horizon, and what Subjects are proper to be repreſented on each; then of its Diſtance, and the different Effects it is productive of, which he illuſtrates, largely, by Lemmas, and Corollaries deduced from them; and concludes his Remarks thereon, rather as a Painter than a Mathematician. The height of the Eye is next conſidered, in which he gives a moſt unaccountable formal Definition of what is called, ſimply, a Scale, which he calls the *Proportional Meaſure* of the original Line. Of the Dimenſions of the Picture he ſpeaks truly; that the whole of it ought to be contained within a Circle whoſe Radius is its Diſtance; alſo, of the bad effects of viewing a Picture out of the true Point, his remarks thereon are judicious and pertinent. He concludes (in the 117th Page) thus. "Having far exceeded the bounds firſt preſcribed to this little Tract, we here conclude, reſerving the doctrine of ſhadows, the method of applying perſpective to ſcenographical repreſentations, as now practiſed in painting the ſcenes of theatres, the manner of drawing anamorphoſes, &c. for a future diſquiſition;" reſpecting which, unleſs he meant, after the ſame manner, to give a Conſtruction of the Scenery in Paſteboard, by way of a Model, I am of opinion, the Community has ſuſtained no great loſs.

THIS Tract, entitled a Familiar Introduction, to the Theory and Practice of Perſpective; by Joseph Priestley; LL.D. F.R.S. is dedicated, with very little Ceremony, to Sir Joſhua Reynolds. In the Preface he tells us, that neceſſity firſt ſet him to ſtudy Perſpective, having frequent occaſion for it, in order to deſcribe his Electrical Apparatus, being ſituated in a place where he could get no one to draw for him; but finding the Books he ſtudied ſo immethodically digeſted, and badly explained, that, in many Caſes, he was able to inveſtigate a Rule himſelf, from conſidering the nature of the thing, ſooner than he could find it out from the Books. What Books he ſtudied from he does not ſay; but I am of opinion, that with a competent knowledge in Geometry, he might deviſe a method as ſoon as he could acquire it. I ſpeak from Experience; for, without knowing Geometry, when I ſtudied it firſt, from the Jeſuit, I was ſo little ſatisfied with his Rules, that I deviſed means to convince myſelf that they might be depended on, reſpecting Lines parallel and perpendicular to the Picture; nothing further is to be acquired from it. Joseph Priestley, LL.D. 1770.

He ſays, that the whole Art conſiſts in drawing the perſpective Appearances of Lines, in no more than five different varieties of Poſition, and in fixing Points, at given Diſtances, in thoſe Lines; meaning, to draw firſt, the Indefinite Repreſentation, and to cut off Portions, repreſenting certain finite Parts, in the Object. He does not tell us, directly, what the five poſitions of Lines are; but, from the Work, I find that three of them are in the Ground Plane, viz. parallel, perpendicular, and inclined to the Ground Line; the other two are perpendicular and inclined to the Ground Plane; and which are all reducible to three, in reſpect of the Picture. He ſeems to lament much, the general deficiency and neglect in cultivating ſo ornamental, ſo valuable, and neceſſary an Art, to many; not only to Painters and other profeſſed Artiſts, but Gentlemen, and others who travel, in order to take Draughts of the various Objects they meet with in their Travels. He is ſurprized, that amongſt the number of Ladies and Gentlemen who learn, and are very fond of Drawing, ſo very few (though they are capable of drawing with elegance) know any thing of Perſpective. I can tell him the reaſon; becauſe there are but few of the Maſters, who teach Drawing, know enough of it, to be capable of teaching others. He expreſſes ſurprize, "that a Perſon who can draw human figures, in every variety of attitude and paſſion, yet are not able to take a correct drawing of the moſt ſimple machine, of a chair, or a table, which require nothing but ſtraight Lines." This I can aver is a Truth; for I have ſeen, in the Works of great Maſters, right lined Objects introduced (See Fig. 31. P. 124.) in which, equal perpendicular Lines, which are fartheſt from the Eye, were repreſented longer than the hither ones; and of conſequence, thoſe which repreſent horizontal Lines converge the wrong way; that *many* Artiſts have imbibed this abſurd Idea is evident in their Performances.

"Of all the *imitative arts* (ſays he) that of Perſpective is capable of being brought, and indeed has actually been brought the neareſt to perfection; becauſe it is wholly within the ſphere of mathematical ſcience. Accordingly we ſee, that there is no object of ſight, be it ever ſo complex, which, thoſe who are ſkill'd in it, are not able to repreſent, juſt as it appears to the eye. By this means, the ideas of all the beauties of nature and art are faithfully preſerved; and thoſe perſons who have not opportunity of ſeeing the objects themſelves, may ſtudy, and be delighted with them, in the works of travellers and natural hiſtorians." And again; "How many philoſophers, and even perſons who have been no mean proficients in other branches, &c. do we hear complaining of their ignorance of this Art, and of the difficulties they have met with in their attempts to learn it; ſo that, they are always obliged to employ a profeſſed artiſt, to make drawings of the apparatus they make uſe of, in their experiments;" or in their Publications. Here, I muſt tell him that he is miſtaken; for, in order to ſave a trifle (as they imagine) in the Drawing, they often employ a *paltry* Artiſt, who perhaps knows leſs of Perſpective than themſelves; by which, their Plates are often ſpoiled. A Sketch may do, being wanted only, to ſhew the Deſign; but, when it is to be engraved, 'tis madneſs, not to have the Drawing correct.

Doctor Priestley.

It is a misfortune, a real loss to the Public, that, when Ships are fitted out, and Persons sent on Discoveries, at the Government's expence, no greater care is taken in the choice of the Artist they take (one is not sufficient) there are many young Artists who can draw, and even paint very prettily, nay fine, yet little or no credit is to be given for the truth of their Portraits. How much it is to be lamented, that many fine Works, Publications of various kinds, have been wholly spoiled, for want of proper Artists to make the Drawings? not that they were not to be had, but because they imagined they saved something, in employing a Person in no Reputation, but often pay more. If they considered only their own Interest, they are losers by it, as the engraving would be the same, and the Drawing, in comparison of it, at least the difference between employing a good Draftsman and an indifferent one is a meer trifle. In this, I believe many are deceived; they imagine if they get a paltry Sketch of what they want, that the Engraver can mend it, and make a fine Print from it. The Engraver is often a meer Mechanic; and if he can make a faithful Copy of the Drawing, 'tis all he has to do; not one in ten is capable of correcting the Drawing be it ever so erroneous, yet *he* derives most credit from the performance. What a noble Work would the History of London and its Environs have made, were the Prints on a larger Scale, and from correct Drawings; and would not the Proprietors find their account in the sale of it?

Perspective, he says, is now carried to such a degree of perfection, we can hardly conceive it possible to be exceeded (in which he advances a Truth); "all that is wanting seems to be a method of facilitating the attainment of this art; and, in that respect, he thinks there is room to improve upon all the Books he has seen on the Subject; of which, the state it is in (amongst Artists) is a proof that the attainment of it is difficult." Here I must enter a Caveat again, and inform him, that *that* is not wholly the case; for they want to acquire it without Study, and will not bear to make use of Rules, though ever so simple; and, in my opinion, no Rules are more so than those used in Perspective. For Instance; what can be simpler than Vignola and Sirigatti, as in this Appendix? used also by Pozzo in his second Volume; which Rules are still used, and ever will be in common cases; but they will not do generally, as it is now, on the Principles of Brook Taylor; in whose small Tract is contained the whole Elements, both in Theory and Practice; but they cannot comprehend it.

The Doctor says, that his Treatise being only a familiar Introduction to Perspective, is by no means intended to supersede other more copious Works, but to make them better understood; so that, to shew how Lines are determined on the Picture, according to the five Positions he speaks of, with the projection of a Circle, is all he has aimed at; which, he thinks, any Person, having a previous knowledge of Geometry, may acquire in a few hours; and indeed, I think so too; also, that every Schoolmaster who is, as yet, wholly unacquainted with the rudiments of it, might make himself master of them in a few Evenings. So they might, having the above requisites, and which, every Schoolmaster *ought* to have; but they can spend their Evenings more agreeably, at Cards, Drafts, or Back-Gammon, with the Excisemaη or Clerk of the Parish, or other Neighbour.

This Work is divided into thirteen Parts; in the first of which, he tells us what Utensils are necessary for drawing, and describes their uses, even of a black lead Pencil; which he is so particular in, as to tell us, that, "they are very useful in order to draw lines that are of no service, but as a direction to draw other lines by them; because, when they have answered this purpose, they may be taken out with a few crumbs of soft bread." The next is preparatory; in which he descends to Minutias, such as, "The first thing I do is to fasten a sheet of paper upon my drawing board, by bits of wafer or sealing wax, at each corner, in order to make it lie flat and steady." This is, in general, the stile or manner of Description used throughout this Work; telling how he does it, rather than how the Students are to proceed. I do not mean to insinuate, that the whole Description is on a piece with the above, for it is not; and I must own, that I am hurt to find such puerilities, in the

the Works of Men of Letters and of Science. In this preparation of the Drawing Board, he introduces five Definitions, and no more are given, here; one of which is exceptionable; viz. "the *horizontal line* is ſo called (ſuppoſing I ſtand upright)." Doctor Prieſtley.

Part III. in three Sections, ſhews how he manages Lines in the three Poſitions to the Ground Plane; the fourth, in two Sections, when they are perpendicular and oblique to the Ground Plane. The fifth Part is applied, wholly, to dividing, meaſuring, and proportioning Lines, in all the former Caſes. The ſixth, in three Pages, is a ſummary account of all the eſſential Rules; in which he ſays, a Line oblique to the Ground Plane is meaſured by drawing *new* horizontal and ground Lines; with other groſs Abſurdities, and trifling Remarks. In three Caſes; of the firſt Section, of the ſeventh Part, he ſhews how a Circle is deſcribed perſpectively, either in a given Square or from a given Diameter, which are judiciouſly managed; another, very ſhort Section, is of different Ground Planes (as he calls them) that is, of Planes inclined to the Horizon; wherein his Vaniſhing Lines are truly drawn, but the Figure, which is intended to give an Idea of deſcending and aſcending, is inadequate and incorrect; the deſcending part appears horizontal, the horizontal Plane appears to aſcend, and the aſcending part, vertical.

I ſhould have obſerved, that he makes three different Methods of Drawing; all the foregoing is by ſuppoſing the place and poſition determined and the meaſures known; the eighth Part in four Pages, is by having the original Figure drawn, on the Ground Plane. He gives but one Example, a Triangle. The other Method, in the ninth Part, is mechanical; a tedious method, by taking the Angle of altitude and declination, from a perpendicular to the Picture, of every Point. The tenth Part is on what he calls orthographical Perſpective, properly orthographical Projection, which is not without merit.

The eleventh Part is on Shadows, in which is but little, worthy of notice; the Shadows are chiefly of Lines perpendicular to the Ground; ſome thrown on inclined Planes, for which he gives no leading Principle. The fourth, and laſt Section, is on reflected Images on Water, where he is entirely out of his depth; for, he places an Object on a Hill, cloſe to the Water, and meaſures the Image from its Foot, on the Hill. Another, at a diſtance, on the Ground, the ſame; and an inclined one is drawn from its interſection with the Ground inſtead of the Water.

The twelfth Part contains general advice and directions relating to the art of Drawing in Perſpective, which is to little purpoſe; for he ſays, "But where extreme accuracy is not required (as indeed it very ſeldom is) there is little occaſion to meaſure any thing; and yet, a perſon who has a juſt idea of the nature of perſpective will make a drawing infinitely more juſt, and agreeable, than another perſon can who ſhall even meaſure every thing *." He has given two Plates from his Hiſtory of Electricity; the laſt ſeems correctly drawn, though he ſays he meaſured nothing, but only fixed the Point of Sight, drew the horizontal Line, determined the Diſtance, and fixed the Vaniſhing Points. He tells us how he did it; but, I fear, no Perſon will ever do another by the Deſcription. "I could engage (he ſays) to communicate to *any* perſon the knowledge that is requiſite to make theſe two drawings in two or three minutes; whereby he might finiſh them, at his leiſure, in little more than an hour, each:" this is wonderful; nor in as many Days, I fear. The 13th contains nine Definitions, five of which were given before.

After this is a ſhort Theory, contained in five Propoſitions and two Definitions; drawn up, he ſays, by Mr. Joſeph Prieſtly of Halliſax, to whom the Reader is indebted; and from whom, he once expected a much more complete and elegant Theory of this Art. He alſo prefixed the Notes, and wrote all the Paragraphs, in which the Propoſitions are referred to; and aſſiſted him in reviſing and correcting the whole Work; ſo that, it is by Meſſ. Joſ. Prieſtley, or Dr. Prieſtley, & Co.

There is, on the whole, merit in this Work, and Ingenuity; how far it may anſwer the End he propoſes I will not ſay; but ſurely, thoſe Works which are more copious, or valuable, contain the Rudiments alſo, and do not require other Introductions to render them intelligible; if they do, they are, at leaſt, very imperfect.

* The Doctor has advanced ſtrange Doctrine here, indeed, which I deny; he might have ſaid ſooner.

EDWARD NOBLE, 1771.

IN 1771 was publiſhed a Treatiſe, entitled, "The Elements of Linear Perſpective, demonſtrated by geometrical Principles, &c." by EDWARD NOBLE.

Had this Author been more mature in his knowledge of the Science he has undertaken to inveſtigate, and as well verſed in the art of Drawing, as in Language, or in Geometry, the Arts might have been indebted to him for his Labour; but, he was in too great haſte to become an Author, and diſplay his Talents to the World.

The Preface to this Work is wrote in a Stile, and with that Spirit which would do credit to one more advanced in years; but his Eloquence or Zeal, being ſomewhat ungovernable, has betrayed him into Error. There is that Expreſſion, in the firſt Paragraph, as induces me to quote it, literally; becauſe, I think it a tacit Reproach to many Artiſts who make a Figure, in the preſent Age. He begins thus. "Thoſe who are content with learning by rote the mechanical rules which compoſe the practice of an art, without any ſolicitation concerning the ſteps which reaſon purſued in their inveſtigation, are more fitted for works of labour than of genius: however their cotemporaries may admire their induſtry, poſterity will never hear of their improvements and invention. In a word, they are totally void of that ſpirit of enquiry, and liberality of ſentiment which, by exerting the mind to trace effects up to their cauſes, becomes the parent of diſcovery. It is this diſpoſition to which we owe the perfection of the arts, and the extenſion of ſcience; and which, with pleaſure, is obſerved to characterize the moſt eminent of thoſe whoſe purſuits lead them to ſtand in need of the art of perſpective."

He ranks Writers on Perſpective in two Claſſes; the firſt are thoſe who have treated the Subject in a maſterly manner, mathematically; but, he adds "they are unintelligible where they are moſt wanted, and uſeleſs where they ſhould be moſt prized." In the ſecond Claſs are thoſe who endeavour to demonſtrate the Principles without mathematical ſpeculation. "Theſe gentlemen (he ſays) may be compared to an architect who would ſupport a building whilſt the foundation is removed. His ſkill and contrivance in a curious diſpoſition and arrangement of props, might be worthy of commendation; but his abſurdity would be equally ridiculous, was he to aſſure us his fabric was more durable, beautiful, and convenient, becauſe it ſtood upon crutches. I mean not, therefore, to depreciate the ingenuity of this claſs of writers, but cannot ſubſcribe to their utility. Their mode of demonſtration, by an infinity of paſteboard and ſtring machinery*, bears the ſame relation to geometrical reaſoning, which geſtures and dumb ſhew do to verbal expreſſion; and even this compariſon is more honorary than juſt."

I am not a little ſurprized to find, that a Perſon, who ſeems to be well acquainted with Euclid, ſhould ſo far forget himſelf; and would aſk him, on what the 11th Book of Euclid is built and ſupported, on which the Theory of Perſpective is almoſt wholly founded? are not the Doctrine of Planes, reſpecting their Poſitions and Interſections, the Interſections of Right Lines with Planes, &c. the Elements on which the whole Doctrine of Solids is built? What are the elementary Principles of Perſpective, according to Brook Taylor? is it not wholly founded on Viſual Rays ſuppoſed to be cut by the Plane of the Picture in a certain Ratio? What are all the Diagrams in the firſt four, and in his 9th, 10th, and 31ſt Plates of his Work (containing the elementary part) intended to repreſent, but Paſteboard and Strings? unleſs, from their clumſineſs, in giving thickneſs to them, he imagines them to be Wood. Nay, he really expreſſes and ſuppoſes them to be Paſteboard, in the 14th Page.

The order in which this Author proceeds in his Work is ſingular, and, I think whimſical, the firſt Chapter containing nine Theorems, part of the Theory, only; for he thinks it irkſome, to crowd too much ſpeculative Knowledge at once on the Mind, therefore, he is continually perplexing the Reader with long Demonſtrations to his Problems, to the Operations, Examples, and Remarks; alſo, by way of amuſing his Readers, he entertains them with Digreſſions. Although I would have Science treated as familiarly as the Subject will admit of, yet, I think

* The Author, by this Sentence, ſeems to have an Eye to Cowley's Theory of Perſpective.

it very unſcientific and irregular to break the thread of reaſoning thus, and give it piecemeal. If the Subject be both theoretic and practical, is it not moſt elegible to keep the Theory diſtinct and ſeparate, to which we may refer on all occaſions? and not have it to ſeek for in various parts of the Work. If the Student chooſes to amuſe himſelf with the practical Part, by way of relaxation from abſtruſe reaſoning, he may, and return to it again when he is in the humour for it. By way of apologizing for the Method he has adopted, we have the following paſſage; "the warmth of imagination and luxuriance of fancy, which impels the mind to the cultivation of the fine arts, is little captivated with abſtracted ſpeculations. It is eſſentially different from that calm and penſive turn of mind, that, with ſilent enjoyment, will trace an intricate truth through all its mazes, and exult in the diſcovery with a zeſt unknown to all but mathematicians: theſe are formed to explore the meanders of the vein, and are happy to dig the *ore* of ſcience; whilſt the others apply it to the convenience and ornament of life, by branching it into thoſe arts, whoſe utility adds to our eaſe and ſafety; and whoſe poliſh enlivens our fancy, and engages our admiration." Edward Noble.

After beſtowing the praiſe due to the production of Dr. Taylor, he ſays; "Yet his fate has been to be more admired and celebrated than underſtood. (becauſe) He ſometimes quotes Euclid in his Demonſtrations, and thereby alarms thoſe who know not that Euclid's Elements are built upon a few principles of common ſenſe, without which the moſt domeſtic and ſimple negotiations of life cannot be tranſacted; and that what they ſhun as ſubjects too ſublime and intricate for their comprehenſion, are only the moſt familiar truths made artificial by regularity, and diſguiſed by a technical language." He appears to be well verſed in Geometry, and has introduced a greater portion into his Work than is uſual, from the 1ſt, the 3rd, 5th, 6th, and 11th, of Euclid, ſuppoſing it eſſentially neceſſary to Perſpective, which takes up no leſs than 100 Pages; making Remarks on the utility of each Propoſition, the Demonſtrations of which are conciſe and elegant, indicating a Talent for geometrical Inveſtigation, which, if he has purſued, muſt, ere this, be very great.

The Work is divided into 14 Chapters, preceded by an Introduction, containing the common obſervation of ſeeing Objects through a Window; which, though pertinent on the whole, has ſome Puerlities. The firſt Chapter contains Definitions and Principles, for repreſenting Figures in Planes which are not parallel to the Picture. Although he has given the Definitions of the firſt Book of Euclid, regularly, omiting ſuch as are to little purpoſe; yet, here, in deſcribing the elementary Planes, he deduces but ſix Definitions, at firſt, viz. the Picture, the Original Plane, and Object, the Entering Line, the Vaniſhing Plane, and Vaniſhing Line, before he begins with Theorems. The firſt is, that all Original Planes which are parallel have the ſame Vaniſhing Line; and the ſecond, that the Vaniſhing and Entering Line (*Interſection*) are parallel to each other; after which follow ſix more Definitions, viz. the Center, and Diſtance of a Vaniſhing Line; Original Line and Entering Point, its Diſtance and Vaniſhing Point. The third Theorem is in theſe words. All original lines which are parallel to each other have the ſame Diſtance and Vaniſhing point. The 4th Theorem runs thus; "The Diſtance of any original Line is the Interſection of its viſual plane, with the vaniſhing plane of that original plane, in which the ſaid original line is ſituated." This is no Theorem, but a Definition; tending to let us know what we are to underſtand by the *diſtance* of an Original Line; but properly of its Vaniſhing Point. I am of opinion, that in the whole Book there is nothing dependant on this Theorem. The 5th is meerly a Definition, informing us, that "the *viſual line* of any original line, is the ſection of the *viſual plane* and the picture," which he has previouſly defined, a Line joining the entering and vaniſhing Point of any original Line; the *Viſual Plane* is defined after the third Theorem. The 6th Theorem informs us, that "the perſpective repreſentation of an original Line is a part of its viſual Line." The 7th is an illuſtration of ſix of the preceding Definitions, by a deſcription of Fig. 4; after which he ſays, that, "The interſection of any

two

Edward Noble.

two visual lines is the perspective representation, of the intersection of their original lines;" which is of no consequence as a Theorem, but may be deduced as a Corollary from several. The 8th is, in substance, the same as Cor. to Theo. 5. of mine; and the 9th is the tenth of mine; an essential one in Practice, though omitted by almost all the preceding Authors (as observed heretofore) from which a pertinent Corollary is deduced, with judgment, which concludes the Chapter.

Chap. II. contains Practical Observations on the foregoing Theory; in one general Problem, viz. "To find the perspective representation of any right-lined figure, situated in a plane not parallel to the picture;" for which there are three Operations, of the various steps, followed by a Demonstration; the whole referring to a theoretic Diagram; after which is a fourth Operation, only to draw the visual lines, i. e. the *indefinite Representations*, by which the Figure is determined on the Picture; followed by two Remarks, with Demonstrations to each, and remarks on them; for which is another Plate and Figure (also theoretic) and which, having no other difference, but the original Plane turned down, and the vanishing Plane turned up, into the Picture, serves equally for both. Then comes the 10th Theorem, in these Words; "When the place of the eye and the original figure are laid down on the same plane, the distance of any original line is parallel to that original line." Brook Taylor, in his second Part, gives this and the fourth in one Definition; for surely, to draw a Line, from the Eye, parallel to an Original Line, may be done, or imagined; the Point in which such a Line cuts the Picture, he calls the Vanishing Point of the Original Line; and the Parallel measures the distance of the Vanishing Point; the Term is arbitrary. That the Representation will tend there is proved afterwards (Prop. 3. B. 2.) viz. that the projection of a streight Line, not parallel to the Picture, passes through its Intersecting and Vanishing Points. Here, it is a Definition, only, as above.

Chapter III. contains *various* methods of finding the representations of right-lined Figures not parallel to the Picture, which might as well have included the general Problem in the foregoing Chapter. It is remarkable that he proceeds to Figures immediately, without first determining Points, and Lines in their various positions, by which, all plane Figures are determinable. Here are two Methods with four Examples, in Triangles and Parallelograms, with Demonstrations? after which is Theorem 11th; by which, the proportion of the finite parts of any Line are perspectively determined; the same in substance as the 13th, of mine; then follows a third Method, with three Examples. A Lemma, with a Problem, follow after, for determining Lines parallel to the Picture; and then we have two more Definitions, with two other Methods; which, save the Terms defined, and used in them, contain nothing new or particular.

Chapter IV. begins with a singular Problem. "By any original line, which is parallel to the Picture, to extend a Plane which shall be parallel to the Picture;" which I conceive no meaning in, nor use for, in the least; to construct various Planes, geometrically, on a Plane, is impracticable, and the operation absurd. This short Chapter is wholly theoretic. The 12th Theorem is, "The perspective representation of any original line, which is parallel to the picture, is parallel to that original line." Now, as an original Line, parallel to the Picture, is necessarily parallel to the Intersection of whatever plane it may be in; its Representation, being parallel to the Original, is also parallel to the Intersection (Eu. 9. 11.) the foregoing Lemma is consequently deducible from this Theorem, as a Corollary, and not at all necessary, previous to it. Four more Theorems, respecting Lines parallel to the Picture, comprehend the whole of this Chapter, all which, save the 15th, are deducible from the 12th; and, from the same Diagram, a general ratio of the proportion of the Representation to the original Line is determinable; in this, we have only, the ratio which the Image of one Line has to another, being the same as is between the Originals; but, the ratio of the Image to the Original is no where determined: being equally distant from the Picture is what should be understood, of the Lines, their meeting in a Point is not essential. This Chapter (being applied to practice) as it is simpler in the operations, should have preceded the two foregoing.

Edward Noble.

In the fifth, two Problems of very little conſequence (reſpecting Lines parallel to the Picture) of which an unneceſſary parade is made, in Solutions, Demonſtrations, Remarks, &c. to as little purpoſe, precede the 17th Theorem, which ſums up the whole eſſence of the laſt Chapter; that the repreſentation of every plane Figure parallel to the Picture is ſimilar to the Original; which (had he determined the ratio of the repreſentation to the original, as well as the parallelifm) is alſo deducible from the 12th. We have, now, two Examples, of plane Buildings, having a Face parallel to the Picture, which, to me, is moſt ſurprizing; that any Perſon, who ſeems to underſtand the Doctrine of Proportion, ſhould attempt to lay down Rules by which others are to delineate Objects, which they do not apply themſelves; for certainly, never Drawings were ſo prepoſterous as theſe, here exhibited, as Specimens of the effect of parallelifm; in which are Doors, one $5\frac{1}{2}$ another 7 times its width; common Windows $4\frac{1}{2}$ and 5 times; ſo that, allowing 3 feet for the width, the Doors are from $16\frac{1}{2}$ to 21 feet high; the Windows from $13\frac{1}{2}$ to 15 feet: Doors, full in front, at leaſt thrice the proper height, Windows more than twice.

I have been rather particular on theſe Chapters, in which may be ſeen the uncommon method of proceeding by this Author. Nevertheleſs, provided that each Chapter, being independant of the foregoing, was prefaced by a Theorem, or two, on which the reſt of it depended; and being well digeſted, the Method is not to be deſpiſed, but may be improved into a good one, for a practical Treatiſe. What I think him moſt reprehenſible for, is his attempt to new model the Science, by innovations of his own; ſuch as altering the Terms and Definitions. This is a fault peculiar to young Authors, who are apt to imagine that they have more diſcernment than others of riper Years. For inſtance; the Ground Line, or Interſection of *any* Original Plane, he calls the *Entering Line*; and the Point, in which any original Line cuts the Picture, the *Entering Point*. The Radial or Parallel of an original Line producing its Vaniſhing Point, he calls the *Diſtance* of the Line; a ſtrange Term indeed; the Indefinite Repreſentation of a Line he calls its *Viſual*, from the old Writers; what induces him to retain this obſolete Term, I can't deviſe, as nothing can poſſibly expreſs their meaning better than Indefinite Repreſentations, as given by Brook Taylor, himſelf. *Working Plane* is another Term he is very fond and makes frequent uſe of; as this is an entire new Term, of his own, I ſhall explain it. Having given, or found, the Vaniſhing Line of any Plane; by means of that Vaniſhing Line, to draw the Repreſentation of any geometrical Figure; that is, to perform the elementary Problems, in Perſpective; and as that Figure may be ſuppoſed in ſome Plane, already determined, he calls it the *Working Plane*, an uſeleſs and unmeaning Term. *Scale Line*, or *working Line*, and *dividing Center*, are alſo his own; the firſt is either the real Interſection, or an imaginary one; the other is the Eye Point, tranſferred, from its true place, to the Picture, in a Line parallel to the former.

The two next Chapters (both Chap. VI.) are called Digreſſions, the firſt is concerning the refraction of Light, the conſtruction of the Eye and the nature of Viſion; which, being entirely optical, I ſhall paſs over; having given, to the World, my Opinion on theſe matters, and here is nothing advanced that is either new or ſingular, it is but reaſonable that others may, unmoleſted, give theirs, ſuffering the Reader quietly to adopt the Opinion he moſt approves. The 2nd is concerning the diſtance of the Eye in reſpect of the ſize of the Picture, &c. in which he ſpeaks, with judgment, of the Diſtance of the Picture, and of the difference between the repreſentation of an Object and its appearance; and determines, truly, the poſition of the Picture, the Station being previouſly determined, in reſpect of the Object; which are the chief of what is contained in this Chapter.

The ſeventh is nearly equal to all the foregoing, containing, "Univerſal methods of finding the repreſentations of objects, in any aſſigned part of the picture without a geometrical plan." Here are two more Problems (3 and 4); the firſt teaches how to determine the Vaniſhing Points of Lines making a given angle with a Line already drawn; the other ſhews how to cut off any portion, from a

Edward Noble.

given Point in an indefinite Repreſentation, or *Viſual* (oblique to the Interſection or otherwiſe) by a general Rule (See Pr. 4, & 10. B. III.) which, if the Diagram was better deviſed, is well managed, and contains the Elements of practice. His Reference to the foregoing Theory is judicious, and ſhews that he is well acquainted with Theory; but 'tis perplexing to a learner to be referred back continually to former Operations, for what ſhould be done in the Example, and is frequently neceſſary, that the application of it may be ſeen, there; alſo his method of referring (though I do not condemn it) is troubleſome; by numbering every different Article, i. e. Theorems, Problems, Corollaries, Operations, Examples, or Remarks, from the begining to the end, without an Index to point them out. Next, he gives an Example of a Pavement of Squares parallel to the Picture, and another oblique to it, which are rather prolix; he determines, with judgment, how much ought to be contained in the Picture from the Diſtance made uſe of. Without any more Examples in Figures he now proceeds to Solids, begining with a whole range of ſquare Priſms, firſt parallel, then oblique to the Picture; after theſe is a plane, or plain Building, ſhewing, in two Plates, firſt the bad effect of a ſhort Diſtance, and in the other how to proceed with a proper Diſtance, when the Vaniſhing Points are not within compaſs, by an eaſy, practical method; there are alſo Duplicates of the Priſms, for the ſame purpoſe, in which is ſhewn both judgment and ingenuity; but he ſhould have ſhewn, in Fig. 43. that if the whole diſtance of his *dividing Center* cannot be applied, an equal portion of the meaſures of the parts of the Building, being ſet on the entering Line, would have produced the ſame effect. Prob. 6. (Fig. 44.) for that purpoſe, is very ingenious, and perfectly geometrical.

The 9th Example is a Summer-houſe (Fig. 46.) a hexagonal Priſm, having one Face parallel to the Picture; in which the Vaniſhing Points of the inclined Sides are out of the Picture. This Object is given for a Leſſon in projecting Mouldings, but a very improper one to begin with; the Method he preſcribes is from a ſection of the Cornice (ſimply, a diſproportioned Cavetto) of the inclining Faces (geometrically obtained) applied at each Angle; but the mitre Angle, in front, is left vague and undetermined. Fig. 49. is the ſame Object, caſually ſituated, in which the method of proceeding for the Cornice is intolerable. In this oblique ſituation, he determines a geometrical Section by the Picture, judiciouſly; and although the application of it to the Object be true, 'tis a puerile and uncouth method, liable to Error; and, as he does not determine the Mitres (or diagonal Sections) at the Corners, impracticable. As it is evident from theſe Examples, that the Author was not ſufficiently qualified for, and competent in projections of this kind, he had ſhewn his judgment in omiting it, wholly, as the Specimens given are ſo very imperfect, and inadequate; and, to begin with a hexagonal, rather than a right Angle, is highly abſurd, ſeeing that the diagonal Sections are more familiar (not eaſier) in practice, in one than in the other; more eſpecially, as hitherto, all his Examples, in plane Figures, are Squares or other Rectangles. Next, he gives a method for deſcribing a Circle; which, though not a bad one, is neither (as he apprehends) the moſt general nor the moſt expeditious; from which he proceeds to a range of Columns, firſt parallel, then oblique to the Picture, in which he is bewildered, ſtrangely; 'tis pity he had not better conſidered his Talent, and ſtopt ſhort of ſuch Objects, which required a better, and more familiar acquaintance with them than he ſeems to have made. Reſpecting the Diſtance he makes uſe of, in the proceſs, although it is accounted for, afterwards, it was inconſiſtent and ridiculous, to attempt (for it is but an attempt) to explain the proceſs by it, when there was room ſufficient, on the Plates, for a much greater Diſtance.

As a reſpite, from the fatigue in following him through this Proceſs, we are now entertained with two more digreſſions. The firſt is a Criticiſm on the Critical Reviewers (for July, 1756, P. 509.) reſpecting the repreſentation of a Circle in Perſpective, for their Criticiſm on Mr. Ware's Sirigatti; which appears to me, to be the production of Mr. Kirby, the ſtile and expreſſions are ſo much alike (See Kirby's Parallel, Page 107.) Mr. Noble's Remarks on it are pertinent and juſt, and delivered with humour. The other Digreſſion is reſpecting the range of Columns

Columns (as above) which are parallel to the Picture; in which he, very judiciously, deſcants on ſome paſſages in Kirby's firſt Work. I could wiſh to tranſcribe ſome of his remarks, but muſt refer the Reader to the original, begining at Page 146; or to the laſt Paragraph, Page 117, of this Appendix, on the ſame Subject. One paſſage (Page 160) is ſo very trite, that, in juſtice to the Author, I ſhall cite it. After ſhewing the abſurdity of his Remarks, reſpecting the repreſentations of Columns, he refers to the Frontiſpiece, which, he ſays, is a tacit encomium on the art (ſee Page 106); after which, "I ſhould imagine that our author, in what follows, means a ſimilar complement to the *Science of Geometry*, by bringing together, in this place, all the abſurdities which a man may commit who attempts to reaſon on a mathematical ſubject, without ſome knowledge of its elements." Edward Noble.

From what has been remarked on the firſt ſeven Chapters, the Reader may conceive a tolerable Idea of the Stile and Character of this Work, which, on the the whole, is not a bad performance; had the Author been as well verſed in Practice as in the Theory of Perſpective, it might have been more uſeful, with but little more expence; but that is a talent few are veſted with, who have treated on the Subject, for want of which, they neceſſarily failed in the main deſign of their Undertaking. As I cannot, now, enter ſo fully on the remaining Chapters, the Reader muſt not expect I ſhall be accountable for what may eſcape my notice in them. The 8th is on inclined Planes and Pictures, ſhewing firſt how to determine Vaniſhing Lines, in thoſe caſes; in which, the Author's knowledge of the moſt abſtruſe part of the Science, is manifeſted, for it is done with judgment, but by very uncouth Diagrams. In this Chapter (Page 171) the Center of the Picture is defined; it is ſometimes mentioned in the laſt, but more frequently called the center of the Horizontal Line; in a Note, Page 82, it is defined the *Seat of the Eye* (as it certainly is) and *ſometimes* (he ſays) it is called the Center of the Picture. Here is a Plate (33) ſhewing a Deſcent, direct (i. e. having the Vaniſhing Line parallel to the Horizon) down two Streets, at right angles with each other; which, being properly conſidered, is abſurd and moſt unnatural; in the next Figure is both aſcent and deſcent, in the ſame manner, having the inclination perpendicular to the Picture, in which is intended ſomewhat of the ſame Idea as in Plate IV. In the next Plate is exhibited the inſide of a Room on an inclined Picture, a ſtrange Subject indeed; in ſhort, theſe muſt be ſeen, to form a juſt Idea of them.

In Page 10, of the Preface, we have an Apology for want of elegance in the Plates, which (he ſays) were not intended to pleaſe the Eye, but to aſſiſt the Underſtanding, in theſe words: "Ornament does not facilitate perſpicuity; fine prints are valuable as pieces of art, but they are uſeleſs in books of ſcience: If obſcurity is avoided, beauty may be diſpenſed with, provided there is an adequate abatement in the price of the book." But I muſt obſerve, that Perſpective is an Art as well as a Science, which is the foundation of all elegance *in* fine Prints, and therefore, cannot well be diſpenſed with in Treatiſes on that Subject; otherwiſe, it ſeems reaſonable to conclude, that nothing elegant can be produced, wholly by its Rules (as is too much the opinion of many) ſeeing no Specimens given to the contrary.

In the ninth Chapter is diſplayed a good deal of Ingenuity, in an original way; for I have no where met with the like. In this Chapter, the *Working Plane* is more particularly applied to uſe, on which (being previouſly prepared) is ſolved 14 Problems; the firſt of which is from the 6th. the ten following, from the 1ſt. and the three laſt from the 3rd. of Euclid; theſe are done on the repreſentations of Planes in various poſitions to the Horizon and to the Picture, for which, the working Line ſerves as an Interſection to the working Plane; which is intended to repreſent the Slate, or Paper, &c. on which Problems are uſually ſolved, geometrically. I could ſay a good deal on this Chapter, but muſt wave it for the preſent; ſuffice it to ſay, that it is ingenious (but might be abridged) and may be ſucceſsfully applied to Practice.

Chap. X. is on Shadows, in general; and firſt, when projected by the Sun; which he treats in a far more theoretic manner than Mr. Kirby, notwithſtanding his ridiculous parade of Lemmas, and Planes of Rays, &c. or indeed than any other, who has treated on Shadows in a Work of this kind, ſave Mr. Hamilton.

Edward Noble.

The Introduction is not equal to what might be expected, from the abilities which are apparent in this Author, by the obſervations he makes, in general. His Theory of Shadows is compriſed in ſix Theorems and a Lemma, which is as much a Theorem as the reſt; three or four pertinent Corollaries are deduced. The whole ſubſtance of this Theory, which occupies eight Pages, is comprized in the three Rules, as I have called them; (but the two firſt are meerly Definitions, and the third a Theorem, or Corollary deduced from the 6th. B. II.) with the Nota Bene on them; Sect. 2. B. IV. P. 261. The Figures given, for illuſtration, are petit and trifling, and by no means ſatisfactory; the References are rendered doubtful, in ſome caſes, by means of two Letters the ſame (two A's, and a's repreſenting them); and, when he tells us, that a Line (AB, Fig. 72.) is oblique to the Picture, it is evident, from the Diagram (of which there are two, ſo near alike, that one would, with propriety, have ſerved every purpoſe of both) that it is meant to be perpendicular. In Art. or Sect. CX. he ſays; "If any *opaque line* be interpoſed between the Sun and the enlightened Plane, &c. and will cauſe a *right-lined* Shadow," &c. as he is expreſly particular in the ſpecies of Shadow, ſhould he not have been ſo, in the Line projecting that Shadow? but what diſtinction is made by *opaque* Line I do not conceive.

I ſhall paſs over two Examples, in 11 Pages, which are ſcarce worthy of Criticiſm, and take notice of the Shadows by candle light, in the next Chapter; delivered firſt, in four pertinent Problems, with two Caſes, and two Corollaries to the laſt; after which is a Theorem, and an Axiom, which ſhould have preceded the whole Theory of Shadows; a repetition of the 22d, given before. The Figure (73) for illuſtration of the Problems, is not badly deviſed; but the 74th is paltry.

The 12th Chapter is on Reflections, on plane Mirrours, which is entered on rather abruptly, and conſidered as a matter of amuſement, ſcarce fit to be ranked amongſt the uſeful parts of Science. He gives four Theorems, which may all paſs for Axioms, and two Corollaries. Two Examples, when the Mirrour is perpendicular, and inclined, to the Horizon; 1ſt, to find the vaniſhing points of reflected Lines, in a plane perpendicular to the Mirrour, and then of Lines perpendicular to it, which is included in the former; two Caſes of the latter (when the Line is or is not parallel to the Picture) with two Problems (not titled) conclude this.

The 13th Chapter contains ſome, not meerly curious Subjects, but what may be turned to uſe, by ſeafaring Perſons, or thoſe who would make proper Obſervations of particular Places they may touch at; ſuch as taking a View of the Place, by Reticulation, from the Maſt Head of a Ship, &c. for which purpoſe, the frame is reticulated unequally, the Threads expreſſing (by their diſtances from the Center) the Tangents of the Angles formed by the Points of the Compaſs, half Points, &c. by which means, the bearings of the Parts from each other is aſcertained in the Drawing. The Part preceding this ſhould, I think, come after; which is, from a Drawing in Perſpective, to determine the Bearings, and proportion of the Parts of the Originals to each other; and laſtly, four Problems in Inverſe Perſpective.

The 14th and laſt Chapter, is of the Anamorphoſis, and the repreſentation of Objects on irregular Surfaces, or on various detached Planes, as in a Theatre; on which Subjects, he has rather given a few hints than preſcribed Rules for the performing them. Upon the whole, there is diſplayed a great deal of Ingenuity, and knowledge of the Subjects contained in this Work; but, like ſome other, it is, in many places, obſcure, on account of the Diagrams, not being the moſt intelligible; many falſe References, Lines and Letters omitted, going to and again from one Plate to another (ſome being miſplaced) is very diſagreeable to the Reader; we are often told to make one Line equal to another, which is only to repreſent an equal Meaſure; theſe muſt render it perplexing to a Learner, who knew nothing of the Subject before.

This Work (an octavo Volume) is compriſed in 298 Pages, and 48 Plates, for the Perſpective; with upwards of 100 Pages, and four Plates, for the Geometry. It is dedicated to Sir Joſhua Reynolds; and printed for T. Davies, in Great Ruſſel Street, Covent-Garden.

THE laſt Publication ſave one (and my own) on the ſubject of Perſpective, is by the celebrated Mr. James Ferguſon, F. R. S. a Man ſo well known to the World by his Lectures and Writings, particularly the former, that the bare mention of his Name to the Work is a ſufficient recommendation of it. Inſtances of this kind of partiality to the Productions of an Author may be met with, but none, in which the expectations of the Public could poſſibly be more diſappointed, or their hopes, of acquiring a clear conception of the Subject he treats on, fruſtrated, than in the Work now before me. As it is almoſt the laſt publiſhed on Perſpective, ſo I affirm it to be the very laſt in merit, that has fallen into my hands; in which, we have an inſtance of the credulity of Mankind, who form their Opinions of Authors too much on credit. As I never had opportunity, to attend Mr. Ferguſon's Lectures, I cannot give my opinion of them, but, from common report, he was clear and explicit; no wonder, having repeated the ſame Experiments ſo often over. Indeed I ſcarce knew him, perſonally, nor have I had leiſure to enter into the merits of any other of his Productions; in ſome of thoſe I have looked into, there is an appearance both of Knowledge and Genius, communicated by Schemes apparently well deviſed and conſtructed, and calculated for conveying Inſtruction in a familiar manner; which ſhould be the aim of every Author, who writes to inſtruct thoſe who are ignorant, a qualification attributed to this Author. JAMES FERGUSON, 1765.

He begins his Preface thus. "In my infirm ſtate of health, a ſituation that is very apt to affect the mental faculties, I thought my late book of Mechanical Exerciſes would have been the laſt I ſhould ever publiſh." 'Tis pity it was not the laſt, if it had more merit; but I have heard that Work ſpoken of, by a Perſon of approved Judgment in Mechanics *, as being erroneous in the firſt Principles. It is a misfortune attending ſome Authors, that they are not ſufficiently acquainted with their own Talents; and I muſt own that I am really hurt, when I meet with any puerile performance, of a Perſon who has acquired Reputation; for it does not follow, that becauſe he has an extenſive general knowledge of things, he is ſufficiently competent in them all, and qualified to treat on them; many Inſtances may be brought to prove the contrary; why then will they hazard the Reputation they have acquired, by publiſhing any ill-digeſted Performance? To gratify a Vanity, of being thought a Man of general knowledge, ſeems to me to be the chief motive, and the moſt excuſable; but, if it be merely with a view to their Emolument that they write, depending on their Name, more than on the merit of the Work, for the ſale of it, they are deſerving of the contempt their Works will, in the end, be treated with, and juſtly; when they, having reaped a preſent advantage from it, are perhaps no more; ſome have *felt* the Mortification of it, and ſeen a ſcrutiny take place in all their Works, owing to their treating on a Subject they were not competent in. It is but reaſonable to expect, when we find an Author, of Reputation, has failed, greatly, in ſome of his latter Productions, that, were we as competent in the other Subjects he has treated on, they might be found equally deficient; and conſequently, muſt leſſen the opinion we had heretofore of the Author; 'tis impoſſible it ſhould be otherwiſe. He ſays, "I have of late amuſed myſelf, at intervals, with ſtudying Perſpective." I have no conception that advanced Years, and an infirm ſtate of health, was a fit time to begin freſh ſtudies, for publication. Indeed he acknowledges (farther on) that the Public are indebted to his Friends for this Work. Having drawn the Figures (which are here exhibited) as Leſſons for his Pupils, without any intention to lay them before the Public, he ſays; "But, upon ſhewing theſe drawings accidentally to ſome friends, they expreſſed their deſire that I ſhould write a deſcription of the rules by which they were delineated. I complied with their deſire, and it is entirely owing to their partiality to me, that I have conſented to this publication †."

* Mr. Rogers, a Coach-maker of ſome diſtinction, in Wincheſter.

† This is ſomewhat of the ſame kind of apology as Kirby makes; ſtrange, that any Perſon ſhould be influenced to publiſh their Works, meerly by the inſtigation of others. If the Author be not, himſelf, ſufficiently competent in the Subjects he treats on, to judge of what is *fit* to publiſh, who is to adviſe, or judge for him?

James Ferguſon.

In obſerving how requiſite it is for Painters, and others, to be acquainted with Perſpective, he takes notice of the great deficiency therein, which is ſo glaring in the celebrated Cartoons, by Raphael, with truth and propriety; firſt in the proportion of the Figures to the Boats, in the miraculous draught of Fiſhes; and in the Transfiguration on the Mount, which, in reſpect of the Figures (he ſays) "appears of the ſize of a little hay-rick." Though he does not conſider this Work as a complete ſyſtem of Perſpective, yet he thinks he may venture to ſay, that thoſe who are maſters of what it contains will find no difficulty in proceeding to what length they pleaſe, without any further aſſiſtance; but I do aſſure them, then, that, unleſs they have far better Ideas than can be acquired from it, they will never underſtand Perſpective. In the laſt Paragraph, he requeſts thoſe who already underſtand Perſpective to conſider, that (if he ſhould appear too verboſe) he never wrote any thing for thoſe who are well ſkilled in the few branches of Science he has treated of, but for thoſe who wiſh to attain a *moderate* knowledge of them; moderate enough, if they are all like this.

This ſmall Tract is divided into three Chapters; the firſt of which he calls the Theory of Perſpective; but ſuch a Theory I never met with before. The firſt Section is a poor Definition of Perſpective; after which, he informs us how to trace Objects on a Plate of Glaſs; the ſecond (in four Lines) tells us that the nearer an Object is, to the Eye, the bigger it appears, and the farther it is off, ſo much the leſs, both in height and breadth. In the 3rd. he tells us, that all Objects become viſible by means of rays of Light flowing from the Object, and paſſing through the Pupil, form their Images on the Picture; and, in the 4th, he refers us, for proof of it, to take the Eye of a Sheep or Bullock, newly killed, on which to make the Experiment; the 5th explains how the Image is formed. In the 6th we are informed what an Angle is, with a tedious deſcription of it; and the 7th ſhews how it is meaſured, by the Diviſions of a Circle, called Degrees; the 8th. is a Definition of an Equilateral Triangle, and the 9th. ſhews how to conſtruct it, on a given Line.

The whole of this extraordinary Theory ſeems to conſiſt in the conſtruction and wonderous Properties of an Equilateral Triangle; for the 10th. Section tells us, that "No object can be wholly and diſtinctly ſeen under a larger angle than that of 60 degrees.—And as this is generally reckoned to be a good angle of viſion, we ſhall keep generally by it, in the following practical part of this Work, where the repreſentations of large objects are delineated. But it will not do well in repreſenting ſmall objects; for, when a perſon looks at a common drinking-glaſs, or a die *, he never brings it ſo near to his eye (unleſs he be very near-ſighted) as to view it under ſo large an angle as that of 60 degrees; becauſe experience teaches him, that he can ſee it better under a ſmaller angle; that is, when at a greater diſtance from his eye." What has all this to do with the determination, or choice, of a proper Diſtance for drawing the perſpective Repreſentations of Objects? it relates wholly to Optics, not meerly Perſpective; giving us ſome conception, at what diſtance from the Eye diſtinct Viſion is performed.

In the 11th Section we have theſe words; "When a Perſon ſtands right againſt the middle of one end of a long avenue or walk, which is ſtraight and equally broad throughout; the ſides thereof ſeem to approach nearer and nearer to each other as they are further and further from his eye, and if the avenue be very long, the ſides of it at the fartheſt end will ſeem to meet: and *there*, an object that would cover the whole breadth of the avenue, and be of a height equal to that breadth, would appear only to be a mere point." The whole ſubſtance of this truly ridiculous Section may be clearly expreſſed in a few words, thus; However the Eye be ſituated between parallel Lines, they will (if continued) appear to meet in a Point; conſequently, the whole Space between them vaniſhes *in* that Point; but it is by no means neceſſary that the Eye, or the Perſon, ſhould be *right againſt the middle*, or at an End, for it is ſo if the Eye be in the direction of either Side, or any where between them.

* It is ſomewhat ſtrange that two ſuch ſingular Objects ſhould offer themſelves together, ſo readily; but perhaps they were familiar to him.

In

In the preceding Theory, we meet with neither Theorem, Lemma, Axiom, nor Definition, in Perſpective; but, in the 12th and laſt Section, we are favoured with four, viz. the Point of Sight, the Place of the Obſerver, the Horizon, and the Point of Diſtance; theſe are all the Terms he defines, every one of which is exceptionable. It is not poſſible to explain the abſurdities of theſe Definitions; and of the whole Section without a Figure; therefore, I have taken the 34th Figure from the firſt Plate, Fig. 4. and the ſecond Fig. 1. The third Figure is two parallel Lines, as AE and DF, which are divided into Squares; AD is the width of the Avenue and O the Station, which he calls the *Place of the Obſerver*, without telling us to form the Triangle ADO, but *that* we obtain from the foregoing; S is taken where you pleaſe, for here is no Rule to fix it, and is called the *Point of Sight*, the two Lines AE and DF are conſequently to tend there; SP is called the *Horizon*, but how it is to be drawn, or for what reaſon, he does not informs us; and a Point taken therein, either to the right hand or to the left, diſtant from S equal SO, we are told, is called the *Point of Diſtance*; which is, in reality, to take a Diſtance at random (not at diſcretion) for S was taken ſo. Now, from this Figure, 'tis obvious, that O is the Station for viewing the Avenue; or it may, with equal propriety, be conſidered as the Eye, or Point of View; and S, being properly determined, is a Point perpendicularly oppoſite thereto, formerly called the Point of Sight, but now, the Center of the Picture. Here is no Interſection, or Ground Line determined; but AD 'tis plain, is meant for it; this is I believe the firſt Treatiſe on Perſpective in which it is omitted. This being the Caſe, of conſequence, the Perpendicular, OG, is the diſtance of the Picture, and GS is the height of the Eye; but he takes the whole of both for the Diſtance, yet he has told us (Sect. 10.) that he ſhall generally make uſe of an Angle of 60 degrees, which AOD is; how then can SP, equal OS, be the Diſtance for AD, under that Angle? The following plainly evinces, that the height of the Eye is added to the Diſtance.

James Ferguſon:

Fig. 34.

"N. B. In whatever point the obſerver's eye is ſuppoſed to be placed, either for a direct or oblique view of the ſide of the object that is neareſt to him, *a ſtraight line drawn from the point of ſight to his eye muſt be perpendicular to the horizon*; which will be the nearer to the eye, or farther from it, as the obſerver is ſuppoſed to ſtand upon lower or higher ground."

This is a moſt extraordinary Paſſage, indeed; the firſt part means little or nothing; that in Italics (it is ſo in the original) means, what it does not expreſs, that a right Line, from the Eye, perpendicular to the Picture, and to the Horizontal Line (not to the Horizon) determines the Center, *alias* the Point of Sight; but, that it will be nearer to the Eye or further from it, as, &c. is what I cannot comprehend, the Picture being upright, i. e. vertical, as it is preſumed to be. However, according to this and all his Diagrams, 'tis plain, that the height and diſtance of the Eye are added together; and conſequently, if its height, GS, be more or leſs, the Diſtance he lays down is alſo greater or leſs; nor is it poſſible to make *more or leſs* of it. And yet he ſuppoſes, all the while, that AD (a ſide of a Square or other Object) is ſeen under an Angle of 60 degrees, when, by this Diagram, it is not above 25, by others leſs. When it is viewed oblique (as at O) 'tis more abſurd; for he ſtill draws the Lines AO, and DO, inſtead of CO, which would give AOC for the Optic Angle; but, of that, he does not ſeem to have the leaſt Idea.

The practical part of this Work, in the ſecond Chapter, is of a piece with the Theory, which, in reality, is too contemptible for Criticiſm; nor ſhould I have thought it worthy of notice, but that, the Author having acquired Reputation (as above) and, as it is not poſſible for thoſe who are unacquainted with Perſpective to form a judgment of it, I think it neceſſary to guard them againſt imbibing ſuch imperfect, ſuch abſurd and dangerous Notions of it, as can only be obtained from this Work; for, the Impreſſions firſt made, though by Ideas the moſt abſurd and inconſiſtent, are not eaſily eraſed, and more perfect Notions implanted in their ſtead. On the contrary, if true and comprehenſive Principles are firſt inſtilled, 'tis impoſſible that ſuch as are limited or falſe can make any Impreſſion; the Mind being guarded, with Opinions which are orthodox, will eaſily detect Error, nor is there any danger of becoming a Convert to falſe and unwarrantable Tenets.

James Ferguſon.

This ſecond Chapter conſiſts of 27 Operations, as he calls them; a Specimen of which, in the firſt, will ſuffice to ſhew what may be expected from it. A Square is given (in ſtrange terms) for the Leſſon; we are told to make AD equal to a Side of it, and, "at any convenient diſtance, draw the horizon SP parallel to AD. Take O according to Sect. 9. and make OS perpendicular to SP, S ſhall be the *true* point of ſight (§ 12.)" Here, the poſition of the Horizontal Line is determined, but its diſtance from AD (the Ground Line) is at diſcretion. He then tells us to deſcribe the quadrant O *p* P, on, S, with the Diſtance OS; and P, "in all caſes, ſhall be the *true* point of Diſtance (§ 12.)" The proceſs being completed, by the Diſtance SP, there follows this moſt extraordinary Remark.

"If the obſerver had ſtood further than O from the ſide AD of the ſquare, as ſuppoſe at o, he would have ſeen that ſide under a leſs angle than 60 degrees; as the angle A o D is leſs than the angle AOD: and then, the point of diſtance muſt have been at d in the horizon; becauſe the point of diſtance in the horizon muſt *always* be taken as far from the point of ſight therein, as the place of the obſerver (O, or o) is from the point of ſight, as we ſhall prove in § 14. and that, if the point of diſtance in the horizon be taken either nearer to, or further from, the point of ſight, than the diſtance of the obſerver is ſuppoſed to be from that point, there will unavoidably be a falſe perſpective repreſentation of the object.—For, ſuppoſe the placing of the point of diſtance in the horizontal line be left to the diſcretion of the artiſt, as is generally done by writers on the *ſcience* of perſpective, and that he had put it at e." &c.

Surely, nothing can equal this; I know of none who has left it ſo much at diſcretion as he does. Has he not told us to draw SP at any *convenient* diſtance? and, does not the diſtance he uſes (added to OG) depend entirely on it? yet, to talk of ſeeing the line AD under an angle of 60 degrees, which at *that* diſtance is not 26; and to tell us, arbitrarily, that, *in all caſes*, it ſhall be the *true* Diſtance; and that, if it be taken either greater or leſs, there will be a *falſe* Repreſentation; aſtoniſhing, all. The whole of this Operation and Remark evinces what I have obſerved; and, that the diſtance of the Picture depends on the height of the Horizon (as in his Nota Bene) a moſt extraordinary circumſtance indeed; how the raiſing or lowering the Eye can alter the Diſtance, I don't conceive.

Fig. 34.

The 14th Section he calls a Demonſtration of the above Rule, for finding the true Point of Diſtance. "Let AE and DF be part of two parallel Sides of a ſtraight avenue, divided into equal Squares, and let trees be planted at the corners of each Square, A, B, &c.—the two ſides of the avenue ſeem to come nearer and nearer to one another, as they are farther and farther from his eye, tending toward the point of ſight S, in the direction of the two ſtraight lines AS and DS." We are now told to draw the Lines B O, E O, &c. from the Trees to the Eye at O, and to draw b c, &c. parallel to AD (which is *neceſſarily* ſo) and then he ſays; "Thus we find, the apparent places of the trees, B, E, &c. muſt demonſtratively be at b, e, &c. as ſeen from the point O, &c.——Now we ſhall ſee, by placing the point of diſtance in the horizon SP, according to the above rule, whether we ſhall or ſhall not have the apparent places of the trees in the ſame point as before." This being done, and AP, bP, &c. drawn, which (though it is manifeſt he does not know the reaſon, in Geometry) becauſe they cut DS in the ſame Points, is, with him, a Demonſtration, that SP, equal OS, is the only *true* Diſtance; as if it would not be ſo at *any* diſtance, O S being equal to SP and A D to CD; alſo, O S parallel to C D, and SP to AD; of which, he ſays nothing, nor ſeems to have any notion of the matter.

Hence (he ſays) it is evident, that, ſuppoſing the Diſtance had been taken any where between P and S (as, ſuppoſe at *d*) the lines would have gone above their *true* places, &c. and the contrary, if the diſtance had been taken beyond P, &c. And (in § 15) he ſays, "Hence it is manifeſt, that, when large objects are to be drawn in perſpective, the point of diſtance muſt be taken at leaſt as far from the point of ſight, as the obſerver could ſtand from the point of ſight when he ſees the ſide of the object next to him under an angle of 60 degrees." So much for his

his Demonſtration; but what he has demonſtrated I know not; the Diagram ſhews, that AP and OC cut DS in the ſame Point (on the Premiſes above) but he demonſtrates nothing, yet thinks he has done ſomething maſterly. James Ferguſon

It is almoſt unneceſſary to ſay more on this extraordinary Paſſage, and more extraordinary Demonſtration, the abſurdity of the whole is ſo very glaring. Without regarding the Angle AOD, which means no thing, all the Proof given is, that, DS being conſidered as the indefinite repreſentation of DF, and OS as the diſtance of the Picture, or of the Vaniſhing Point S, it is immaterial in what poſition OS and CD (equal SP and AD, reſpectively) are placed, on the Picture, ſo they are parallel to each other, the point c is neceſſarily the ſame; cD repreſenting the length CD, equal AD. But, to imagine, that SP is proved to be the *true* Diſtance of the Picture. for ſeeing any Object, equal AD, under an angle of 60 degrees, is falſe and moſt abſurd; and ſhews that Mr. Ferguſon knew not what he was about. Or how the planting of Trees at each corner of the Squares, which he makes a part of the Premiſes, or Conditions to be granted, affects the Demonſtration, or in any wiſe illuſtrates it, I muſt own I do not ſee.

If the Square ABCD be drawn by the Diſtance OG, the Perpendicular of the Equilateral Triangle, which he gives as a general Rule for determining the *true* Diſtance, for large Objects, and at the height aſſumed (GS); it would be more prepoſterous than the one which he ſays, "a Child could tell that it would be a monſtrous repreſentation of a Square in perſpective." Sa is the Diſtance, according with it, and Aa cuts DS at *c*; then, *bc* being drawn parallel to AD, gives A*bc*D (inſtead of AbcD) for the repreſentation of ABCD; as by *his* Diſtance, determined, and Height aſſumed.

He now proceeds with his Operations, in full confidence of the infallibility of the Rule he has attempted to demonſtrate; for, throughout the whole, there is not the leaſt variety or deviation from it, except in the laſt Plate; in which is given a Chair with a ſquare Seat, and a moſt clumſey Table (a block, being a paralelopiped, would have done as well) in which the Sides tend to the point of Diſtance, in the Horizon. All the Objects, in this Work, are ſquare (as he calls them) that is right angled, but chiefly Squares, and compoſed of Squares; except a drinking Glaſs (a ſmall Rummer or Goblet) which he makes an attempt on, but a vile one, exceeding all deſcription, and two rows of Cones, inſtead of Columns, ſupporting a long extended Plane, ſeen underneath; the Cones being repeated eleven times, on each hand, like his Trees, planted at the corners of Squares. Such ridiculous Subjects (as are often repeated in the Work) attract the attention of ignorant Perſons, in Perſpective. who are ſtruck with aſtoniſhment, at the appearance of a great length, on the Picture; for what *elſe* there is, worthy of writing Rules for, at the requeſt of his Friends, I cannot find.

The whole Work abounds with ſuch Puerilities as are ſcarce excuſeable in a School-Boy; as for Example; "To put a ſquare Pavement in Perſpective, conſiſting of any given ſquare Number of equal black and white ſquare Pieces of Marble, and viewed by a Perſon ſtanding at a Diſtance from it, almoſt even with one of its Corners." He explains, by a Note, what a *ſquare* Number means, which might be neceſſary in Arithmetic; but neither the explanation nor the Term has any buſineſs in Perſpective, that I know of. That the Pavement conſiſts of *black and white ſquare pieces of Marble* is childiſh; what difference does their Colour make in the Operation? or whether it is at all neceſſary to be known, of what Materials they are. That 'tis viewed by a Perſon at a *Diſtance* from it is certainly neceſſary, but that might be underſtood, as it could not be ſeen otherwiſe; but that he is *ſtanding*, we ſhould not know; and being even with one of its Corners, requires an explanation, the term *even* has no meaning, here. The ſame Figure undergoes another Operation (the 8th) as an oblong ſquare Pavement, whoſe length is any given number of times its breadth. This is the general method of proceeding, with ſuch Authors, who have no conception of cuting off *any* determinate length, in an indefinite repreſentation of a Line.

James Ferguson

Operation 13th. "To put five ſquare Pyramids, in Perſpective, ſtanding upright on a ſquare Pavement compoſed of the Surfaces of 81 Cubes." Never, ſurely, was any thing more ridiculous; the Surface is not compoſed of Cubes, but of Squares, and the *thickneſs* of the Floor is immaterial. The 18th. "To put a ſquare Pyramid of equal ſized Cubes in Perſpective." Is it poſſible for any Perſon to conceive the meaning of this? The ſquare Pyramid is four ſquare Steps, whoſe height is equal to their breadth (a thing not very common) with a Cube on the uppermoſt; i. e. begining, at the top, with one Cube, the upper Step is formed of nine, three in each Side; the next five, ſeven, and, the bottom, nine; the ſquare Number, 81, as above.

To remark on every part of this moſt extraordinary Performance, I have neither leiſure nor inclination for, as every Paragraph in it is more or leſs exceptionable; one Operation is, "to put a *Square Hollow* in Perſpective;" another, "To put Stairs with Flats and Openings, ſtanding on a horizontal Pavement of Squares." The Figure, poor as it is, is taken from S. Serlio, an obſolete Author, who proportions every Object by Squares, a trifling and childiſh Method (See Sect. 1. P. 16.) and thus is every thing done in this Work; which I have dwelt longer on, for the reaſons given above.

But, to conclude, the 3rd Chapter contains a deſcription of an Apparatus for drawing Objects, without Rule, which has ſome genius in its Conſtruction. A Sketch of it, he ſays, was given him by the late Dr. Bevis, who he ſuppoſes was the Inventor, having never ſeen the like before. It is very ſimple, conſiſting of two Equilateral Arches, as in Fig. 35. with a Label fixed at each corner (A and B; or threads of Silk, or fine Wire (ſtrained tight) fixed to pieces of wood or mettal (C, and D,) ſo contrived as to fix, by a Notch on the edge or otherwiſe, to the Arch, and to ſlide freely from one extreme to the other (from A or B, to S). The Arch being fixed upright, and having a Sight-hole to look through (as in Fig. 13. Plate II.) the two Labels, or Threads, may be brought to correſpond with any Point or Angle of the Object; then, a Frame being contrived to fold with hinges, at the bottom, or on either hand, having a Paper fixed on it, for drawing, being turned up, or ſideways againſt the Arch, mark the place where the Threads, or Labels, interſect; and ſo proceed to take as many Points as are neceſſary, and join them by right Lines, or as they appear in the Object; by which means, though tedious in the proceſs, a juſt repreſentation of any regular Object may be obtained.

Henry Clarke 1776.

THE laſt writer on Perſpective, at leaſt that I have heard of, in England, is Mr. Henry Clarke, teacher of the Mathematics, &c. at Mancheſter, who publiſhed a practical Work, in octavo, in the Year 1776, the ſame in which the firſt Impreſſion of my Work was intended to be publiſhed, but was prevented by the Fire at the Printers, in the Savoy, on the 2nd of March; about 300 being delivered to Subſcribers, the reſt were deſtroyed, there. This Work is in a Courſe of Leſſons for the uſe of Schools, intended in two Volumes; but one, only, has yet appeared in public, though treated, in every reſpect as if the whole was publiſhed.

He ſays, it may have the appearance of Vanity to attempt to write on a Subject, which ſeems to have been quite exhauſted; and again "I do not pretend to offer any thing new in Principle; but the Method I have obſerved, I flatter myſelf, will be found to be better adapted to the Capacities of Youth, than what is propoſed in any Treatiſe that has hitherto appeared on the Subject." For which purpoſe, he has been at the trouble of collecting all the different Treatiſes he could hear of in all Languages; and from a Compariſon, he ſays, it appears that while one part have written purely for Mathematicians, the other have treated it in ſo limited a manner, that the Reader could not acquire from them the leaſt Idea of the Principles of the Art. This has been ſaid again and again, by others; and yet, is it not ſtrange that Mr. Clarke, although a Mathematician, ſhould not give a Theory to his *own* Work? "The Principle (he ſays) upon which this Method is founded is ſo obvious, that it is a matter of ſurprize it has not been univerſally received by the Connoiſſeurs."

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This leading Principle is only the common obſervation of ſeeing Objects through a Plane of Glaſs, from which, his Method "(the only rational one," he ſays) is deduced; the whole Buſineſs being to find the interſecting Points of the Viſual Rays. Surely, Mr. Clarke does not propoſe, in this, to offer any thing new, for it is, I believe, as old as any Author, we are acquainted with, who has written on Perſpective; and, in my opinion, gave the firſt Ideas of the Subject. On that Principle, Vignola and Sirigatti, and others before them, performed all their mechanical Operations. "Indeed (he ſays) the Demonſtrations given, to this fundamental Propoſition, may not be comprehended by every one; but, perhaps, to ſuch, it may be thought a ſufficient Proof of the truth of the Operation, to find, that, when the Planes are all brought into one, the Thread, or Viſual Ray, ſtill interſects the Picture in the ſame Point——When the firſt Leſſon is clearly underſtood, the main Point is accompliſhed. For as Lines, Planes, and Solids, of whatever Figure, may be eaſily conceived to conſiſt of Points, the Perſpective of them may be found by this one general Rule." It is indeed very eaſy to fix on and determine certain Points in Objects, but not to conceive that they conſiſt of Points. "This alone I have often found ſufficient to ſeveral grown Perſons, to let them into the whole practice of Perſpective;" indeed there are many who cannot readily comprehend any other; for ſuch, the Method is well adapted, and the Demonſtration he gives of it is full as ſatisfactory as that given by Mr. Ferguſon. Henry Clarke.

The Jeſuit's Perſpective (he ſays) has made more pretenders to it, than any other; a mere jumble of Practice without Theory, and full of Abſurdities; whoſe moſt general method, in repreſenting a Building, &c. is to have one Side parallel to the Line of Interſection. When the View is partial, there is, he ſays, nothing wrong in this Method; but when a ſingle Building conſtitutes the whole Picture, nothing is more abſurd. "It is juſt as if a Painter ſhould ſhew you a fine Portrait with half the Face covered." The Compariſon is really pertinent; for, in this caſe, he ſays, that the Houſe, which ſhould be the principal Object, is only a part of a more general View. And, unleſs the Obſerver be ſituated *exactly* in the front of a Houſe, (he means, ſo, as not to ſee an End) it will always be viewed on the Angle, and muſt therefore have two Points of diminution; which, he further ſays, is the only right Method. In theſe judicious remarks, it is apparent that this Author has a juſt Idea of Perſpective, as it conduces to exhibit the moſt agreeable and natural Repreſentations; and, in the application of his Rules, to practice, he is comprehenſive, but falls far ſhort of that clearneſs and preciſion which is neceſſary thereto.

In general, his Definitions are clear and full; but, in the ſecond, he confines the Idea of an Original Plane to that on which the Object is ſeated, as others have done; as if every Plane in the Object, which is repreſented, had not an Original as well as the Object; the other may be particularized by the geometrical or Ground Plane. I think the 10th Definition is exceptionable; that the point in which a Perpendicular, from an original Point, cuts the Interſection is the Seat of that Point. On the *Interſection* it may be ſo called; but, unleſs the geometrical Plane be perpendicular to the Picture, and the Point in one of them, it is not the Seat on either. The original Point being ſituated on an inclined Plane means nothing, more than, that it is not in the Ground Plane; and conſequently, a Perpendicular determines its Seat thereon; by the ſame means, it is determined on the Picture.

I cannot ſuppoſe, that Mr. Clarke could ſo far miſunderſtand Dr. B. Taylor's Definitions of the Directing Line and Point, the Director of a Line, &c. and am always ſorry to find unneceſſary Innovations; as in Def. 11. in which, he calls the indefinite repreſentation of a Line the Director of it, or of a Point ſituated therein; alſo, his primary and ſecondary Directors are inſignificant and perplexing to a learner, and mean nothing; 'tis the Vaniſhing Point that directs the Line, which, being drawn, has nothing to direct. The Definitions are illuſtrated by three moveable Diagrams, which are not badly deviſed, yet capable of being much improved; and in theſe (with four Axioms) conſiſts his whole Theory, particularly the firſt, which is furniſhed with a Thread, indicating a Viſual Ray, to prove that a Point is truly projected.

Henry Clarke.

The linear part of this Work consists of 30 Lessons, and 24 Figures; most of the Plates (the size of the Page, 4¼ Inches wide) contain two each, some but one. The first is of a Point, the 2nd Lines, oblique, (in the ground Plane) and then he proceeds to Figures; as Triangles and Squares; also Poligons, and Circles, with the Plan of a plain Building, directly in front, without a single Reference; in all which, the Representation is determined by Lines drawn to the Eye, from the Original Figure, except when it is produced by the indefinite Representations, wholly. He then proceeds to Solids, in Prisms and Pyramids (some inverted) and also to a plane Building (direct and oblique) simple indeed; but, in the whole, I don't perceive that he ever shews how to cut off any portion of an indefinite Line, by bringing down the distance of the Eye, and applying the measures, or the ratio of them, on the Intersection, or otherwise, though the most practical; the other, when the distance of the Eye is considerable, or the Object large, or remote from the Picture, is wholly impracticable, except on a very small Scale; besides, it is often very inaccurate, and sometimes cannot be used at all. By the other means, let the distance of the Eye or of the Object be ever so great, any portion of them may be applied and produce the same effect, with accuracy; surely, it should not be rejected because 'tis common, and used by *every* other Author, unless Mr. Clarke had found a *better* expedient.

It is remarkable, that, after the Definitions, he proceeds to Practice, making use of Intersecting and Vanishing Lines and Points, as if they were familiar to the Practitioner, without any preparation of the Picture, shewing how those Lines and Points, with their heights and distances, are determined thereon, or even explaining that they *are* the Lines, &c. before defined; why the Eye is placed above the Vanishing Line, and the original Figure (inverted) below the Intersection, are never explained or made mention of; how then could he suppose that his method of proceeding is better adapted to the capacities of Youth than any other on the Subject? for I maintain, that, being ever so clear in the Definitions (which he strenuously recommends) knowing no more, and not having their use and meaning better explained, not one in fifty would conceive what they meant, when applied to use, or what the Operation tended to.

Next, he proceeds to inclined Planes and Lines, in which, he says he has been more particular, as it is but little understood; nor does he know any who has rendered it practical but Kirby. I must own, that he is more explicit, on *that* head (except as it relates to the projection of the regular Solids, in which he is far outdone by Highmore) than most others, and am surprized to find that Mr. Clarke (being a Mathematician) should benefit so little from him, but more from Brook Taylor's Essay; for, although he proceeds geometrically in the process, I am sorry that I can say nothing in praise of it, being intricate and perplexing in a very great degree; even 'sGravesande proportions inclined Lines, in a far more masterly manner. He makes frequent use of a *Line of Elevation*, begining at the eighth Lesson, which is never defined, or its use properly explained; and, should he not have given a Lesson for determining Vanishing Points, before he makes such frequent use of them in his Operations?

He proceeds with a Cube, resting on an Angle; and then to the Dodecahedron, which is projected on Pozzo's Principles, viz. by the perspective Plan and Elevation. The Icosaedron follows next, performed by Vanishing Points but without a Vanishing Line, save the horizontal; in which are two Vanishing Points (*S* and *s*) which we are told to find, of LM and HI, (rather of LT and HQ) which, being considered as Sides of the Object, are inclined to the Horizon in very different directions, but in equal Angles; one vanishing above, the other, necessarily, as much below the Horizon. Though this Figure is given in the most simple position, he is by no means clear in the Description, nor are half the Vanishing Points determined, which are necessary. Last, he gives a Globe, which is projected mathematically, by finding the transverse and conjugate Axes of the Ellipsis which represents it; and which are justly determined, geometrically, and simple enough. After which, he remarks on the necessity of seeing a Picture from the true Point

of View; becauſe, the true repreſentation of a Globe (being an Ellipſis, when ſeen obliquely) cannot appear a Circle (as the Globe always does) in any other. He thinks, "it would be no bad method, if our *capital* Landſcape Painters, and even thoſe in *Portrait* too, were to write down on the back of the Canvas, the height of the Center, and the Diſtance of the Perſpective Plane, ſo that the Picture might be placed (or viewed) to the beſt advantage." Mr. Clarke, I find, has had but little acquaintance with them, or he could not be ſo unreaſonable as to requeſt them to do any thing of the kind; for how is it poſſible that they ſhould, when perhaps, it never once entered into their Ideas, that there were any ſuch things determinable, for the Picture they have drawn? Henry Clarke.

Sciagraphy, or the projection of Shadows, is the next Subject he treats on, which is compriſed in ten Leſſons; and what is, to me, very ſingular, he begins with Shadows by a Torch or Candle firſt, and is the moſt copious on it, having but three Leſſons on Shadows by the Sun. Here is no Introduction nor Definition given, nothing particular, or intereſting, in the whole; in the Shadow of a broad Hoop (Leſſon 35.) he has omitted the deſcription of that part of the Shadow which is thrown on the interior Surface, and which, is the only part that is difficult; the Center of the Hoop, which is thrice referred to, is not marked, nor the *x* to be found; nor a *t*, in the Shadow of the outer Circle. In the next Leſſon, I preſume he means (in Line 2. Page 77.) perſpectively parallel, for the Lines are not *reſpectively* ſo. In Leſſ. 39. Page 81. Line 1. and 2. we have Line of Interſection, for Vaniſhing-Line, and for *W* is *V*, in the Plate; alſo, *V* is referred to ſeven times, which, in the Plate is *v*; and an *s* is wanting in the 40th. I mention theſe, becauſe there is no Errata; and he ſays, in the Preface, I have been particularly careful to have it correct in the printing; becauſe (he adds) a ſingle typograpyical Error, is ſufficient (for thoſe, who ſet up for Judges) to paſs Sentence on the whole Performance; but I am far from being of that opinion; if it was, *I* had been condemned, without redemption, or redreſs, having a *copious* Errata (as the Monthly Reviewers obſerve) yet I intended it to be perfect, in that reſpect; but, with all my vigilance, I muſt own (as Mr. Clarke ſays) that, *Humanum eſt errare.*

Catoptrics, or reflected Images of Objects, comes next, in ſix Leſſons; which is entered on in the ſame abrupt manner. On Water, as a horizontal Mirrour, here is nothing but upright Objects, whoſe meaſures are all made equal; but there is a ſmall miſtake in the firſt Leſſon, which concludes with "the object and its ſhadow, having *always* a common vaniſhing point." In *this* Caſe, only, when the Line, whoſe Image is required, is parallel to the reflecting Surface. In the laſt Article of the ſecond Leſſon, for a Pyramid, his method is erroneous; inſtead of determining the Baſe of the Pyramid, continued to the ſurface of the Water, we are told to make the part of the Image, which is ſeen, equal to the part of the Object which it repreſents; but, being inclined to the Horizon, they are not ſo. In Fig. 44. *nr*, the reflected Image of DG, or the repreſentation of *dg*, not being parallel to the Mirrour, cannot, I preſume, have the ſame vaniſhing Point (*V*) with the top and bottom of the Mirrour.

The 45th Leſſon is a good one, and well deſcribed, but the Vaniſhing Line of the Mirrour is aſſumed; in the 46th we are told to find it, yet, I don't find any Leſſon which ſhews how *. 2, 3, and 4, are omitted, though twice referred to, which makes it perplexing; and we are frequently told to find a Vaniſhing Point (as Z) which would be conſiderably out of the Picture, without telling us where it would be, or making any apology for it, ſo that, it may be imagined to be where the Letter is put. On the whole, he ſeems to underſtand it, himſelf, but is not explicit enough, in deſcribing the proceſs, to make it clearly underſtood by others, who are not already competent in it.

* Leſſon 26 is the only one in which it is determined, but not deſcribed. The ſame Figure ſerves for Leſſon 22; in which, we are told to make *vs* equal to *v*S, and the Angle *vs*V equal to a given Angle, and V will be the Vaniſhing Point of a given Line; yet we are never told to draw the Perpendicular *v*V, in which it is determined. After three more Leſſons, on the ſame Figure, we are told to draw V*F*, which will be the Vaniſhing Line of a certain Plane.

Henry Clarke.

And now, after what has been advanced, hitherto (by which it ſeems as if the Author was tolerably acquainted with the Subject) in the 47th Leſſon, we are ſhewn how to prepare the Picture, and fix the meaſures of the Object to be repreſented; and, in the 48th a Diſtance is determined, from which, I ſhould have conjectured, that he knows very little of the matter. The 47th exceeds all deſcription; from the poſition of the Picture to the Object, and the ſituation of the Eye, he ſeems to have quite forgot what he aſſerts in the Preface; that, when the Object is viewed on the Angle, it muſt have two Points of diminution, and, that no other method is right. He alſo reprehends the Jeſuit for having, commonly, one ſide of the Object parallel to the Picture; yet, here, he runs into the ſame Error, unneceſſarily, and in a far more extravagant manner, than the Jeſuit ever does; one would be led to imagine, that, from the ſituation of the Picture, in reſpect of the Object and the Spectator, he meant to ſhew the abſurdity of it, by rendering it truly ridiculous; yet, without ſo much as attempting to ſhew the impropriety of it, and determining the true poſition of the Picture, on his *own* Hypotheſis, from a Station determined. Reſpecting the Diſtance (in the 48th) I am ſtill more ſurprized; at the diſtance S, where he ſays, the Angle *a* S *b* is 60 Degrees, I find it no more than 32; but, at the real diſtance, for A B, it is but 22 (the Vaniſhing Line, V A, has nothing to do in it) the Diſtance, and Optic Angle, ſhould be determined from I N, the Interſection. But, to tell us, that, "from ſuch a diſtance (viz. 60 deg.) the objects may be ſeen to perfection, the viſual angle being neither too great nor too little," is truly ridiculous; beſides, it is *too great*, and occaſions diſtortion in the parts of Objects at the extremes, on account of the obliquity of the Viſual Rays.

The 49th Leſſon is on Theatrical Perſpective; in which, he pays a Compliment to the Projectors of the Mancheſter Theatre, which he ſays is admirably well executed; but I am in doubt, from the Specimen here given whether his Judgment be competent in it; and, in my opinion, he had ſhewn *real* Judgment in leting it alone; for ſurely, Mr. Clarke cannot imagine that he has done any thing to *any* purpoſe, from which the leaſt improvement may be made in the Theatre; or, that any Perſon can apply his Leſſon to the leaſt uſe. I muſt be ſilent, here, for I own, that I can make nothing of it.

Horizontal Perſpective, in two Leſſons, comes next; "this *kind* of Perſpective (he ſays) relates chiefly to Cieling-pieces, &c.—And, in order to produce this Deception, nothing more needs be done, than to make the Center of the Cieling the Center of the Picture." &c. but why is that neceſſary? I am of opinion, that a much better effect may be produced without that coincidence. What little is done, on this Subject, is much better, and more comprehenſive than the laſt. In theſe Figures there is an appearance of the diſtance of the Eye being laid down on the Horizontal Line, which is never done elſewhere; but, as the Picture is horizontal, there can be no diſtinction of Vaniſhing Lines, reſpecting the Horizon. The 52d and laſt Leſſon, is called "Directions for taking Perſpective Views without any Meaſurement." I muſt recommend the Reader to the Work itſelf, for a Deſcription of it, being (as I think) Original, it would not be proper for me to tranſcribe it.

This Work is compriſed in 113 Pages, with a copious Preface; dedicated to Charles White, Eſq. F. R. S. of Mancheſter; beſides the three Diagram Plates, here are thirty for the Leſſons, which do not contain one ſtriking Object: the laſt, which is given meerly for ſhew, is a Bridge (Plate 18 Inches long) cut off at both ends, which makes but a poor figure, and as poorly engraved. It was printed for the Author, and ſold by Mr. Murray in Fleet-Street; Price 5 Shillings, ſewed.

In the Preface, we have a Plan of the ſecond Volume; in which, he ſays, "I have ſhewn the Application of the foregoing Rules to a variety of Subjects," viz. to the various parts of Architecture, various modes of Building, Squares, Streets, Avenues, &c. to the projections of the Sphere, and to ſundry notable purpoſes, in Aſtronomy; Aerial Perſpective (tranſlated from L. da Vinci) and to conclude with ſome hints for mixing Colours, on Sir I. Newton's Theory. Here is much propoſed; but I fear, that (like Kirby's) the Execution of it depends too much on the reception which this firſt Volume meets with.

Remarks on the Reviewers of the Compleat Treatiſe on Perſpective, by the Author.

ALTHOUGH the Compleat Treatiſe on Perſpective has never been publiſhed, otherwiſe than by delivering it to the Subſcribers, yet being in the hands of ſo many, it has been noticed by all the Reviewers; and firſt, in the London Review, for December 1775, which, with the Appendix, contains a copious account of the principal part; it is concluded in April, 1776; to which account is annexed a Plate, taken from the Work, exhibiting ſome of the moſt particular and intereſting Subjects and Paſſages in the Work, which are judiciouſly choſen, and evinces their judgment in the Subject. But, as they cannot agree with me, in my phyſical Opinions, I could wiſh they had pointed out in what I have miſconceived the Philoſophers, or the ſenſe of their Arguments, which, is ſaid, I have ſometimes rather rudely cenſured; becauſe I might have retracted my Error (being conſcious of it) in the next Edition.

It is, however, ſome conſolation to me, that I am not entirely ſingular in my Opinions; for, I find that ſome, who have had an Univerſity Education, and are deemed no inconſiderable Philoſophers, have not been aſhamed to avow the ſame Opinions, in many reſpects, openly, to the World. Indeed it is my fixed opinion, that many more would do the ſame, if they durſt; but ſo prevalent are the Opinions of a truly great Man, whoſe character is univerſally eſtabliſhed, that others who perhaps are no more convinced by his reaſoning than I am, on ſome Subjects, dare not venture to contradict, and own their real Sentiments, leſt they ſhould be deemed deficient in their Capacity to form a Judgment of them. Such, in my opinion, is the motive which induces many Perſons to ſubſcribe to their Hypotheſes; but, whilſt I am bleſt with reaſoning faculties and a power of thinking, I ſhall never be aſhamed, to own that I cannot acquieſce in Opinions which I do not comprehend, or rather believe the contrary; nor can I pleaſe myſelf with the Idea of being very ſagacious, in matters which, I find, my reaſoning faculties are not formed to explore.

I take this opportunity (which I intended long ago) publicly to return thanks to the Gentlemen who were concerned in this Review for the Candour they have ſhewn to my Productions; heretofore extended to my Treatiſe of Geometry, as well as to the Work on Perſpective; "which (they ſay) to do it that juſtice it merits, would exceed the limits preſcribed us."

Remarks on the Critical Reviewers.

In the Critical Review for July following (Page 35, to 44) the Treatiſe is honoured with their particular notice and approbation. In the ſecond Paragraph of the 37th Page it is ſaid, that "The Demonſtrations of the Theorems, are given in a very elaborate manner, and may probably appear very tedious to many Readers." With ſubmiſſion to the Gentlemen of this Department, I cannot but think they are under a miſtake in this matter; the Examples I have given for Illuſtration are indeed ſomewhat copious, becauſe I conceived, that, after Demonſtration (which ſeldom exceeds ten Lines, oftentimes not above ſix or ſeven, and ſometimes not ſo many) to ſee it illuſtrated in a familiar manner would greatly enforce the Demonſtration, and for that purpoſe I have ſometimes given two Examples to the ſame Theorem, which may ſeem a part of the Demonſtration, or at leaſt make it appear elaborate; for I have endeavoured to render the Demonſtrations as ſimple and conciſe as poſſible, and that by reaſoning only, without refering, or as little as I could, to the Elements of Euclid. The 13th Theorem may appear elaborate, on account of the ſeveral Demonſtrations of various parts, which are dependant on it, thereby rendering the Theorem more general and applicable in practice, which being taken altogether, will appear operoſe; but, as that Theorem is of the utmoſt conſequence, in practice, it could not be diſpenſed with.

Their correction of the laſt Sentence in the next Paragraph is juſt; it was undoubtedly meant that the Opinions have no foundation, which is implied in the imagined Errors having no exiſtence. But, their objection to the placing of that Section (the ſixth) I alſo think is without foundation; ſince the Section itſelf is not objected to, I would aſk, and could wiſh they had ſpecified, where it could be placed with more propriety? For, although it is rather digreſſive, as not being, directly, a part of the regular Work; yet, as it is wholly theoretic, it muſt neceſſarily precede Practice; and, it would have been very improper to have preceded the Theory. This being the Caſe, where could it be placed better than between the two Parts, Theory and Practice? all the objection ſeems to lie, in numbering it amongſt the reſt, but rather to have made it a diſtinct and ſeparate Section, as being digreſſive, and unconnected with the foregoing; for, as it could not precede the Theory, it muſt neceſſarily follow after; and, it was abſolutely neceſſary to guard the Artiſt againſt thoſe Errors, before he applies himſelf to practice, by pointing them out, ſhewing how they may be avoided.

I cannot agree with thoſe Gentlemen, in the firſt Section of the third Book ſeeming to be unneceſſary, as containing nothing material. It is an introductory Preface, to the Practice, which is here treated ſo, as to ſhew its abſolute dependance on the foregoing Theory, from which, every Rule in it is deducible; at the ſame time, ſo as to be wholly independant of it; that is, without having peruſed the foregoing, every thing neceſſary for practice may be acquired from it. For which reaſon, although a general Plan was given in the general Preface, this contains an abridged Plan of this Book, only; alſo, an Apology for the alteration of ſome Terms by Dr. Taylor, which had been general, and for his introducing new ones, (which ſome Artiſts have great objections to) which have a more general and extenſive ſignification; together with the rationale and geneſis of Vaniſhing Lines and Points, better ſuited to the Capacity of the unſcientific Reader; who, from his deficiency in Geometry, cannot enter into, and clearly comprehend the Theory.

That ſome of the Definitions are repeated, in the ſecond Section, which were given before, is eaſily accounted for; here are, in the whole, but fourteen, including the Picture, nine of which, with the Picture, are neceſſary in the Theory; the other four are not ſo, or have different and more general Names. From theſe I have deduced as much of Theory, in Corollaries and Remarks, as I conceive neceſſary for the Practitioner, who is unacquainted with Geometry, as Leſſons, neceſſary to be retained and applied in Practice.

Thoſe Gentlemen are pleaſed to ſay (Page 42.) that, in many places, I reprehend Dr. Taylor, and ſometimes without cauſe, as in Prob. II. P. 134. they are miſtaken in the Problem, 'tis the 11th; and, in the ſecond Impreſſion it is the 28th Page. That the Problem is an elegant one I have ſaid, but, that his *conſtruction* of it is ſo, I cannot agree to, or his manner of proceeding in the Operation; which, if they had taken the trouble to complete the Circle, as in his Diagram, would be found, as I have ſaid of it, diſtorted and prepoſterous, on account of the ſhort Diſtance, and great dimenſion of the Circle. After which are theſe words; "Our author ſhould here have been very cautious not to err himſelf, where he is blaming another ſo much, as we think he has done, in ſaying, five points in an ellipſis are not ſufficient for aſcertaining the true curve of it; for all Geometricians know that they are ſufficient." From what follows (in the Original) it is evident, that by the word *aſcertained* is meant *deſcribed*, as it is in the ſecond Impreſſion; for, how is it poſſible that I ſhould mean otherwiſe, than, that it is neceſſary to determine more Points, in order to deſcribe it? ſeeing that, I have ſhewn how it may be aſcertained by *three* Points, only; and, having determined two, when thoſe words are uſed, I proceed immediately to find more, in order to complete it.

It is alſo ſaid, in the 5th Paragraph, Page 36. that, in Sections 4. and 5. B. 1. (which are wholly digreſſive, containing matter of meer Opinion, in phyſical Enquiries) I frequently reflect on Sir Iſaac Newton and other great Philoſophers, with whoſe writings I *ſeem* not to be ſufficiently well acquainted. I have ever held the Name of that great Man in the higheſt veneration, amongſt Men, but cannot attribute

attribute infallibility to *any* Man; and am really concerned for the dignity of a truly great Character, when they presume to attempt an investigation of what cannot be comprehended. Voltaire, in his Philosophical Dictionary, Vol. II. P. 63. on the limits of human Understanding, asks, "What is Matter? Thy equals have written ten thousand Volumes on this article; some qualities of this substance they have found, which are as well known to Children as to thee.—See this grain of Corn which I throw into the Ground, and tell me how it rises again, to shoot forth a Stem with an Ear. Inform me how the same Ground produces an Apple on this Tree, and a Chesnut on the next to it? I could fill a Folio with such Questions, to which thy Answer *ought* to be, *I know not.* And yet, thou hast taken thy Degrees, and weares a furred Gown and Cap, and art called *Doctor.*" Again (P. 77.) "Matter exists, this you know; but you know it no farther than by your sensations. Alas! what avail all subtilties and *sophisms*, since reasoning has been in vogue? Geometry has taught us *many* truths, Metaphysics *very* few. We weigh, we measure, we analize, we decompound Matter; but, on offering to go a step beyond these rude operations, we find ourselves bewildered, and an abyss opens before us." And again, P. 153. (On the Soul) "Know, Man! that God has given thee Understanding to guide thy behaviour, and not to penetrate into the Essence of the things which he has created."

That the whole of the first Book, except the two Theorems in the third Section, is entirely foreign to a Treatise on Perspective, cannot I think, with justice, be said; seeing that, to have some Idea of the mechanical cause of Vision, with an explanation of some optical Terms, and other matters in the second Section, prepares the Student for a clear conception of the Appearances of Objects; and, to distinguish between the Appearance and Representation, in perspective, is certainly a necessary requisite towards a thorough understanding of the Subject; and, although the greatest part of this Book is digressive, from the main Design, yet I cannot conceive that the Work could have been *better* by the omission of it; for, though *some* of my objections may be injudicious, *others* may excite the attention of those who are more versed in the Subjects, and occasion a new turn to their investigation of them. That my Reputation should suffer, by the appearance of a presumption arising from a too superficial knowledge of the Subjects adverted on, I have no apprehension of; although I am conscious, that the freedom with which I have advanced my Opinions will be thought presuming and impertinent by many; but, I think the Presumption much greater, in attempting to explore, than in owning our deficiency in Ideas tending to comprehend, what is incomprehensible to our limited Understandings.

It is not to be wondered that the Work should, in another Person's opinion, be somewhat deficient in orderly Composition; though it is what I am rather particular in, and, on that account, have changed the place of the first Theorem, in the first Impression to the eighth, in the second, and otherwise varied the ninth, tenth, and eleventh: I could wish they had pointed out the Deficiency, or mentioned any other Work, on the Subject, as a Pattern for my imitation; for I must own, that I know not where to make any improvement in the third, on that score. The occasional introduction of some things, by way of Illustration, or Embellishment, may be apparently foreign, yet have some distant affinity to the Subject, and not wholly impertinent. But the Charge of disgusting Comparisons, with other Authors, is, I think, entirely groundless, having studiously avoided it, as what I have an aversion to; for, except that, improving the Diagrams, and perfecting the Problems of Dr. Brook Taylor, and shewing their general utility, may be deemed comparative, I know no other Author with whom I have made *any* Comparison. However, making allowance for these Remarks, or Reflections, from professed Critics, I think myself highly obliged for the Character they have given of the Work, as "a very valuable Performance, containing every thing that is really useful, in Perspective;" on which, though large Extracts, or Quotations, are taken from various parts of the Work, I do not find that they have attempted to criticize, or, to prove any thing I have advanced thereon erroneous.

It were to be wiſhed that the Editor of thoſe Criticiſms had been more correct, in tranſcribing various Paſſages; in ſome of which, the ſenſe is manifeſtly perverted, either by the omiſſion, or ſometimes by changing an Article, as in Page 38. Paragraph 2. Line 7. where, inſtead of, between the Eye *and* the Object, is inſerted the Eye *of* the Object. In the laſt line of the ſecond Par. P. 39. (for the Appearance *is* to deſcend) the Verb-Subſtantive (*is*) is omitted.

Remarks on the Monthly Review.

In September following, The Compleat Treatiſe on Perſpective was noticed by the Monthly Reviewers, but not in ſo copious a manner as in the two others, the whole being compriſed in four Pages; the greateſt part of which is employed on the firſt Book, which, they obſerve, is not neceſſarily connected with the Subject-matter of the Work. I have, in the Preface, ſaid the ſame, of the two laſt Sections, but cannot be perſuaded that the whole of it is ſo; the third Section, particularly (on Direct Viſion) is eſſential; nor is the ſecond wholly redundant.

As what I have obſerved, reſpecting the Title, in the firſt Page, of the Preface to this Appendix, was from memory; I find, that I have attributed to the Critical what belongs to the Monthly Reviewers; which they deem a kind of Tax on the Public, when, in order to make a Work *complete*, more Matter is introduced than is neceſſary for that particular Subject; but, to draw a Line, which ſhall limit the bounds of what is really and only neceſſary, ſo as to have the united concurrence of every Critic, is impoſſible. That there are ſome Sections of the firſt Book digreſſive is allowed; but certainly, whatever is introductory to the Subject, and is not a part of any other diſtinct Science (as Geometry, for inſtance) I am of opinion ought to be given in the Work. But, as Perſpective is a branch of the Science of Optics, whatever is neceſſary to elucidate, and enforce the Principles, muſt be conſidered as a neceſſary part of Perſpective, as well as of Optics, in general.

Theſe Gentlemen are rather ſevere on my Scepticiſm, reſpecting the materiality of Light, the cauſe of Colour, &c. but muſt own, that I am as far from being a convert to thoſe philoſophical Tenets as ever; and, notwithſtanding what Mr. Canton has ſaid, or can ſay, am not yet convinced that Water is compreſſible; which, if it contained forty times more Space than Matter, would not, I preſume, admit of a doubt, as it might eaſily be proved by Experiment, which would be obvious to every one: although, like Air, it may be expanded to a very great degree, it has not an equal property of being condenſed into leſs compaſs, than its natural ſtate. For what purpoſe, I would aſk, are ſuch extravagant Doctrines advanced? ſeeing they cannot bring ſufficient proof, in ſupport of it.

They obſerve, that elegance of Style is not expected, as ſuch Subjects will not admit of it. I am not inſenſible, that there are a few inaccuracies (particularly in the firſt Impreſſion) in point of Grammar, which is not to be wondered at; an Author being, generally, more intent on the Subject, and I had no Aſſiſtant, in the reviſal, from the Preſs, as many have; yet, if they had compared it, in that reſpect, and the Style, in general, with other Works on Perſpective, if they found no cauſe for Praiſe, I am perſuaded that they would, at leaſt, have been ſilent, on *that* head. Repetitions are often neceſſary, and are done of choice, frequently; but own, that ſome had eſcaped my notice, before it was too late; nor do I think it neceſſary to make an Erratum of every literary Error.

However, I cannot but acknowledge, that they condeſcend to make ample amends, in what follows, viz. "We regret this the more, becauſe, as a writer on Perſpective, he is, in many reſpects, ſuperior to any with whom we have yet been acquainted." And again, in the concluſion, it is ſaid, "Nevertheleſs, on the whole, this Treatiſe is comprehenſive, intelligible, and uſeful; it is the moſt complete Work, on the Subject of Perſpective, which has yet been publiſhed; the execution muſt have been laborious and expenſive, and we heartily wiſh that the Author may meet with ſuitable encouragement."

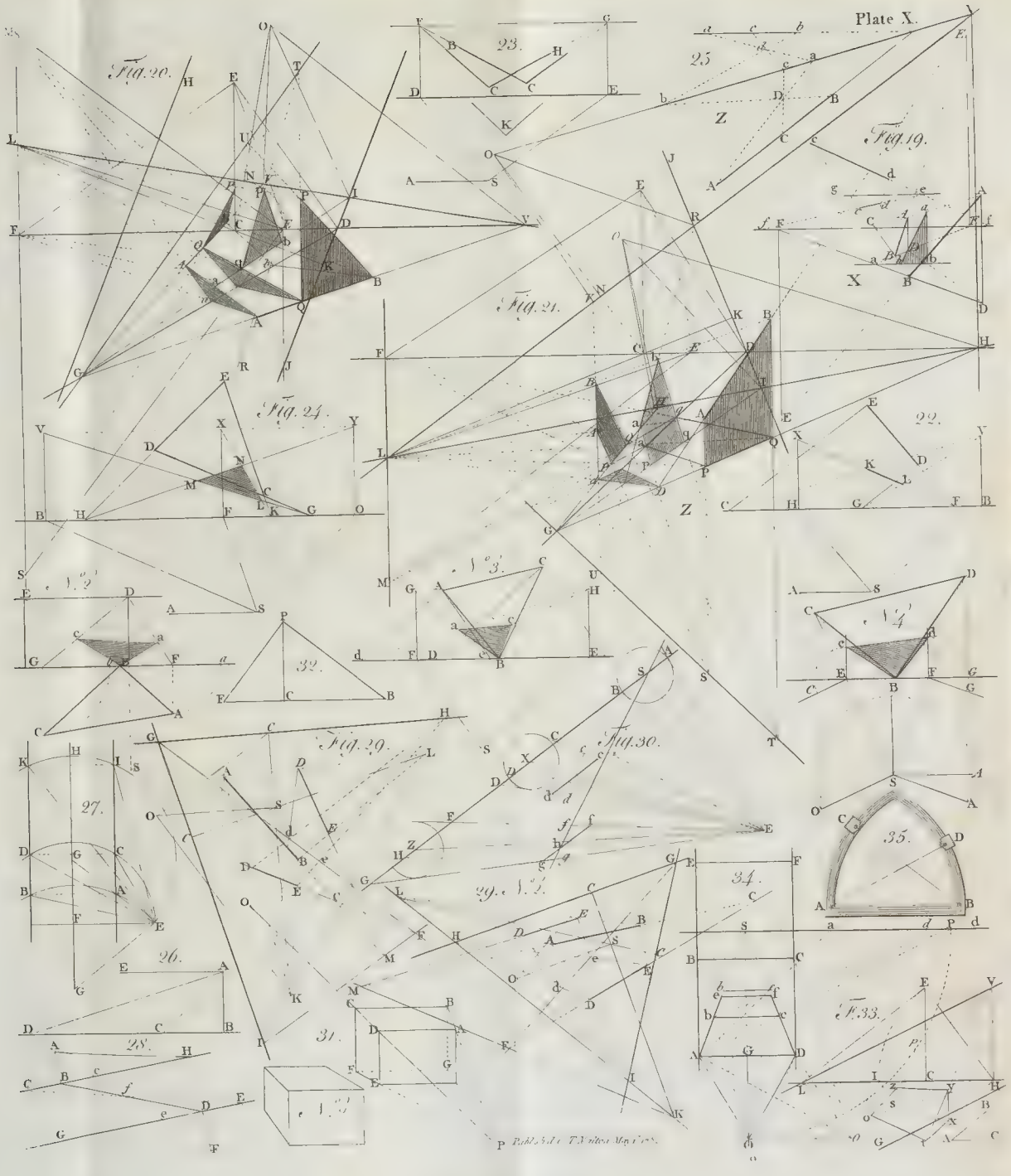
Plate X.
Fig. 20.
Fig. 21.
Fig. 24.
Fig. 29.
Fig. 30.
Fig. 19.
23.
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X
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A ſmall folio Treatiſe, by W. HALFPENNY, was publiſhed in 1731, which is wholly practical; and although 16 years after Dr. Brook Taylor publiſhed his firſt Tract, there is not the leaſt trace of his Principles to be ſeen in it. This Author I had overlooked, or I ſhould have ſpoken of him, in the proper Place, and Date; but, as nothing can be ſaid in its Praiſe, there would be no loſs to the Public if it had never been mentioned, or had never exiſted.

Many more have wrote on Perſpective, in their Courſes of the Mathematics, in England; alſo OZANAM, a French Author, of reputation, in which I find nothing that is worthy of notice. In Theory he is ſomewhat copious, but the whole ſubſtance of it might be compriſed in leſs than half the number of Pages, and in Practice he is tedious and puerile; his Operations (on the Jeſuit's Principles) are poor and prolix; ſo that, on the whole, (in 72 octavo Pages, and 36 Plates, the ſize of the Page) there is nothing to recommend it to the Public. He makes uſe of the Term, dividing Center, from whom, moſt probably, Mr. Noble borrowed it; but I think 'tis not worth adopting.

The mathematical Work, by MULLER (mentioned in Page 132.) has about nine Pages, and ſeven Plates, on Perſpective. (Vol. I.) The whole Theory, conſiſts of three Theorems only, and thoſe not eſſential; for they teach nothing more than, that an original Line (not parallel to the Picture) and its Repreſentation, will meet in the Point of Interſection; that the Repreſentation will paſs through the Vaniſhing Point of the Line, and the Line, itſelf, through the Directing Point. He ſays, that other Authors have ſpun it out into voluminous Works, but have not made the leaſt improvement in it; the whole of what they contain (Examples excepted) being compriſed in his firſt Problem, viz. How to find the Appearance of a Line, in the Ground Plane.

The late ingenious Mr. MARTIN publiſhed a ſmall Eſſay, with only one Plate, in order to explain the Principles of Perſpective. He was a voluminous Writer, and therefore, it cannot be exepected that he ſhould be thoroughly verſed in every Subject; of which, this Eſſay is a manifeſt proof.

The famous Mathematician, Mr. EMERSON, in his Works, has alſo touched on Perſpective, as a branch of Optics. His Theory I cannot ſay much of, it is mathematical; and, in Practice,—I hope that very few will practiſe from it. Here are two Prints given, as finiſhed Pieces, ſuch as cannot be deſcribed to do juſtice to them; the Deſcription given, and the Prints, are of a piece, puerile and abſurd beyond all I have ever met with; inſomuch that, a Boy, of eight or nine Years old, could not have given a more childiſh Specimen of his Genius and Abilities, in Deſign, Execution, and Deſcription.

Other Works, by Painters, both antient and modern, contain ſome remarks on Perſpective, which, in ſome of them, are pertinent, in others to little purpoſe; as Albert Durer, Lomazzo, Leonardo da Vinci, De Piles, Freſnoy, &c. who ſays, that, although Perſpective cannot be called a perfect Rule, yet it is a great ſuccour to Art, but is frequently very fallacious, and often falls into Error; ſuch miſtaken notions many have of Perſpective, who ought to be better acquainted with it.

Amongſt thoſe who have written on Painting, in England, BARDWELL is the moſt copious on Perſpective, and ſeems to have a tolerable notion of it; but is ſomewhat dogmatical, in reſpect of the Horizontal Line and Ground Plane, &c. which he imagines to poſſeſs ſome peculiar privilges. Here are upwards of 20 Pages and ſix quarto Plates, which ſhew taſte in reſpect of Deſign; but they are all, ſave one, in the common parallel poſition; ſo that, in reſpect of the Leſſons inculcated, three or four would have been ſufficient, to anſwer every purpoſe derived from them. In the laſt is a good Leſſon, for a block of Stone obliquely ſituated; but, in reſpect of

of the Ram's Horns, he ſeems inclined to turn the whole into Burleſque, as no Perſon, in his ſenſes, would attempt any thing of the kind, by Rule. If the Perſpective in this Work, had been well digeſted, in a more regular order, there is what many would deem ſufficient for a Painter to know; and even as it is, much more than what is generally practiſed may be learned from it, without underſtanding Perſpective, or being able to account for the Rules.

Thus, having finiſhed the Taſk I had impoſed on myſelf, as propoſed long ago, and planned in the Preface, I hope, that I have acquitted myſelf with that Candour and Impartiality, both with reſpect to the dead, and the living Authors, as I flatter myſelf will meet with the approbation of all who are well acquainted with, and real Judges of the Subject, on whoſe Deciſion I reſt my Appeal: Neither, I preſume, will the living *Authors* (on mature reflection) accuſe me of making unfair or uncandid Remarks on their Works. A more arduous Taſk my Pen was never engaged in; the main deſign of the undertaking, particularly in the laſt Section, being to reſcue Perſpective from the diſcredit of the puerile treatment it has ſuffered from incompetent Authors, and to put it on a more reſpectable footing, than it has hitherto been ſuppoſed to ſtand on, in the Temple of Science; for, although its general tendency is not ſo extenſive, as many other branches of the Mathematics; yet, as it manifeſtly tends to the improvement of the Polite Arts, which embelliſh Life and Converſation, and make Society more generally agreeable, it is by no means to be diſpenſed with, or treated with indifference.

Although my intention was to be brief, in my Remarks on the Authors, yet, the number of them, and their various obſervations, with my animadverſions thereon, have ſwelled the Appendix almoſt to another Volume; but, inſtead of abridging, I could have extended my Remarks to ſeveral Paſſages, on which there was great room to expatiate, and more fully on others; yet, conſidering that the Subject is ſo little known, and that I have written for the peruſal of very few, comparatively, to have dwelt longer on it had been unneceſſary, ſeeing that, neither Advantage (directly) Pleaſure, nor Satisfaction could be derived from it, to the far greater part of the Community.

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